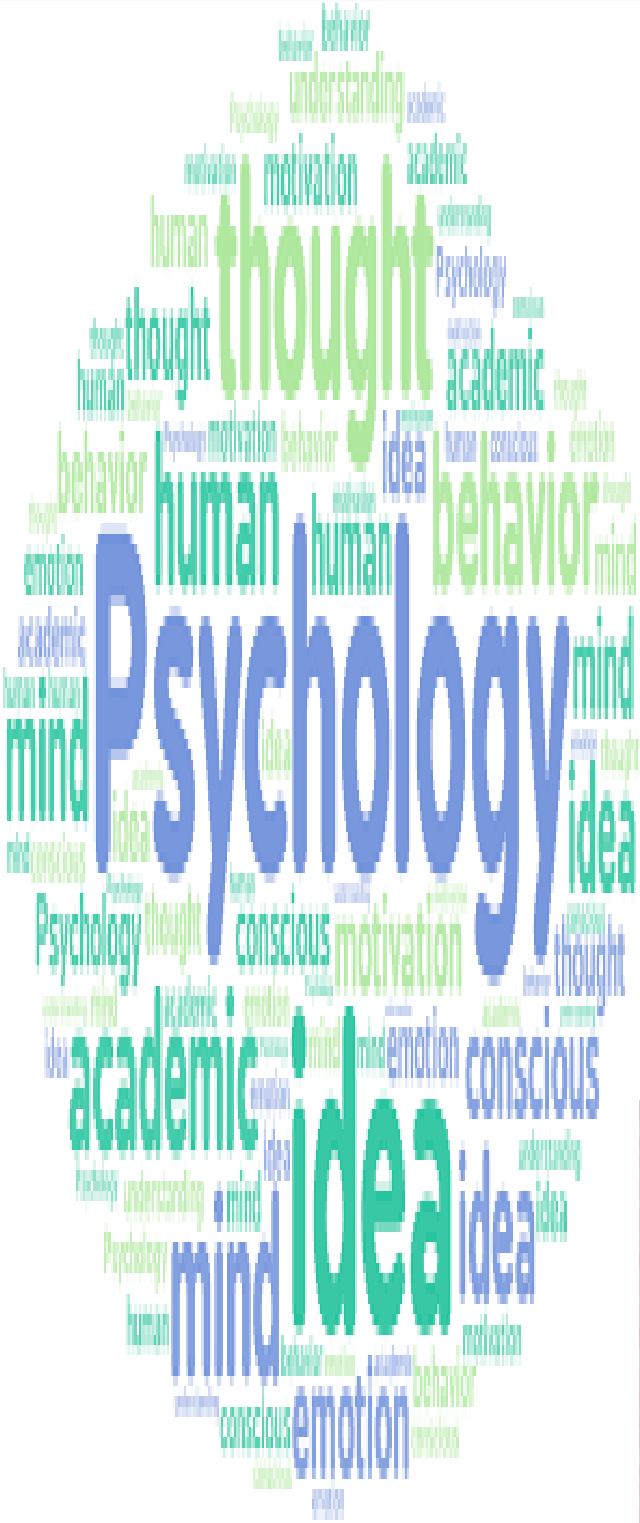
UNIT-6 Thinking, Intelligence and Creativity



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What is Theoretical perspectives on thought processes: Associationism, Gestalt, Information processing, Feature integration model Concept formation: Rules, Types, and Strategies; Role of concepts in thinking Types of Reasoning Language and thought?

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Theoretical perspectives on thought processes: Associationism, Gestalt, Information processing, Feature

Associationism

Associationism is a theory that connects learning to thought based on principles of the organism's causal history. Since its early roots, associationists have sought to use the history of an organism's experience as the main sculptor of cognitive architecture. In its most basic form, associationism has claimed that pairs of thoughts become associated based on the organism's past experience.

So, for example, a basic form of associationism (such as Hume's) might claim that the frequency with which an organism has come into contact with Xs and Ys in one's environment determines the

frequency with which thoughts about Xs and thoughts about Ys will arise together in the organism's future.

Associationism's popularity is in part due to how many different masters it can serve. In particular, associationism can be used as a theory of learning (e.g., as in behaviorist theorizing), a theory of thinking (as in Jamesian "streams of thought"), a theory of mental structures (e.g., as in concept pairs), and a theory of the implementation of thought (e.g., as in connectionism).

All these theories are separable, but share a related, empiricist-friendly core. As used here, a "pure associationist" will refer to one who holds associationist theories of learning, thinking, mental structure, and implementation. The "pure associationist" is a somewhat idealized position, one that no particular theorist may have ever held, but many have approximated to differing degrees (e.g.,

Locke 1690/1975; Hume 1738/1975; Thorndike 1911; Skinner 1953; Hull 1943; Churchland 1986, 1989; Churchland and Sejnowski 1990; Smolensky 1988; Elman 1991; Elman et al. 1996; McClelland et al. 2010; Rydell and McConnell 2006; Fazio 2007).

Outside of these core uses of associationism the movement has also been closely aligned with a number of different doctrines over the years: empiricism, behaviorism, anti-representationalism (i.e., skepticism about the necessity of representational realism in psychological explanation), gradual learning, and domain-general learning. All of these theses are dissociable from core associationist thought (see section 7).

While one can be an associationist without holding those theses, some of those theses imply associationism to differing degrees.

These extra theses' historical and sociological ties to associationism are strong, and so will be intermittently discussed below.

2. Associationism as a Theory of Mental Processes: The Empiricist Connection

Empiricism is a general theoretical outlook, which tends to offer a theory of learning to explain as much of our mental life as possible. From the British empiricists through Skinner and the behaviorists (see the entry on behaviorism) the main focus has been arguing for the acquisition of concepts (for the empiricists' "Ideas", for the behaviorists "responses") through learning.

However, the mental processes that underwrite such learning are almost never themselves posited to be learned.So winnowing down the amount of mental processes one has to posit limits the amount of innate machinery with which the theorist is saddled. Associationism, in its original form as in Hume (1738/1975), was put forward as a theory of mental processes.

Associationists' attempt to answer the question of how many mental processes there are by positing only a single mental process: the ability to associate ideas.

Of course, thinkers execute many different types of cognitive acts, so if there is only one mental process, the ability to associate, that process must be flexible enough to accomplish a wide range of cognitive work. In particular, it must be able to account for learning and thinking.

Accordingly, associationism has been utilized on both fronts. We will first discuss the theory of learning and then, after analyzing that theory and seeing what is putatively learned, we will return to the associationist theory of thinking.

3. Associationism as a Theory of Learning

In one of its senses, "associationism" refers to a theory of how organisms acquire concepts, associative structures, response biases, and even propositional knowledge. It is commonly acknowledged that associationism took hold after the publishing of John Locke's Essay Concerning Human Understanding (1690/1975). However, Locke's comments on associationism were terse (though fertile), and did not address learning to any great degree.

The first serious attempt to detail associationism as a theory of learning was given by Hume in the Treatise of Human Nature (1738/1975).Hume's associationism was, first and foremost, a theory connecting how perceptions ("Impressions") determined trains of thought (successions of "Ideas"). Hume's empiricism, as enshrined in the Copy Principle demanded that there were no Ideas in the mind that were not first given in experience.

For Hume, the principles of association constrained the functional role of Ideas once they were copied from Impressions: if Impressions IM1 and IM2 were associated in perception, then their corresponding Ideas, ID1 and ID2 would also become associated. In other words, the ordering of Ideas was determined by the ordering of the Impressions that caused the Ideas to arise.

Hume's theory then needs to analyze what types of associative relations between Impressions mattered for determining the ordering of Ideas. Hume's analysis consisted of three types of associative relations: cause and effect, contiguity, and resemblance. If two Impressions instantiated one of these associative relations, then their corresponding Ideas would mimic the same instantiation. For instance, if Impression IM1 was cotemporaneous

with Impression IM2, then (ceteris paribus) their corresponding Ideas, ID1 and ID2, would become associated.

As stated, Hume's associationism was mostly a way of determining the functional profile of Ideas. But we have not yet said what it is for two Ideas to be associated (for that see section 4). Instead, one can see Hume's contribution as introducing a very influential type of learning—associative learning—for Hume's theory purports to explain how we learn to associate certain Ideas.

We can abstract away from Hume's framework of ideas and his account of the specific relations that underlie associative learning, and state the theory of associative learning more generally: if two contents of experiences, X and Y, instantiate some associative relation, R, then those contents will become associated, so that future activations of X will tend to bring about activations of Y.

The associationist then has to explain what relation R amounts to. The Humean form of associative learning (where R is equated with cause and effect, contiguity, or resemblance) has been hugely influential, informing the accounts of those such as Jeremy Bentham, J.S. Mill, and Alexander Bain (see, e.g., the entries on John Stuart Mill and 19th Century Scottish Philosophy).

Associative learning didn't hit its stride until the work of Ivan Pavlov, which spurred the subsequent rise of the behaviorist movement in psychology. Pavlov introduced the concept of classical conditioning as a modernized version of associative learning.

For Pavlov, classical conditioning was in part an experimental paradigm for teaching animals to learn new associations between stimuli. The general method of learning was to pair an unconditioned stimulus (US) with a novel stimulus. An unconditioned stimulus is just a stimulus that instinctively, without

training, provokes a response in an organism. Since this response is not itself learned, the response is referred to as an “unconditioned response” (UR). In Pavlov’s canonical experiment, the US was a meat powder, as the smell of meat automatically brought about salivation (UR) in his canine subjects. The US is then paired with a neutral stimulus, such as a bell.

Over time, the contiguity between the US and the neutral stimulus causes the neutral stimulus to provoke the same response as the US. Once the bell starts to provoke salivation, the bell has become a “conditioned stimulus” (CS) and the salivating, when prompted by the bell alone, a “conditioned response” (CR).

The associative learning here is learning to form new stimulus-response pairs between the bell and the salivation.

Classical conditioning is a fairly circumscribed process. It is a “stimulus substitution” paradigm where one stimulus can be swapped for another to provoke a response.

However, the responses that are provoked are supposed to remain unchanged; all that changes is the stimulus that gets associated with the response.

Thus, classical conditioning seemed to some to be too restrictive to explain the panoply of novel behavior organisms appear to execute.

Edward Thorndike’s research with cats in puzzle boxes broadened the theory of associative learning by introducing the notion of consequences to associative learning.

Thorndike expanded the notion of associative learning beyond instinctual behaviors and sensory substitution to genuinely novel behaviors. Thorndike’s experiments initially probed, e.g., how cats learned to lift a lever to escape the “puzzle boxes” (the forbearer to

"Skinner boxes") that they were trapped in. The cats' behaviors, such as attempting to lift a lever, were not themselves instinctual behaviors like the URs of Pavlov's experiments.

Additionally, the cats' behaviors were shaped by the consequences that they brought on. For Thorndike it was because lifting the lever caused the door to open that the cats learned the connection between the lever and the door.

This new view of learning, operant conditioning (for the organism is "operating" on its environment), was not merely the passive learning of Pavlov, but a species-nonspecific, general, active theory of learning.

This research culminated in Thorndike's famous "Law of Effect" (1911), the first canonical psychological law of associationist learning. It asserted that responses that are accompanied by the organism feeling satisfied will, ceteris paribus, be more likely to be associated with the situation in which the behavior was executed, whereas responses that are accompanied with a feeling of discomfort to the animal will, ceteris paribus, make the response less likely to occur when the organism encounters the same situationThe greater the positive or negative feelings produced, the greater the likelihood that the behavior will be evinced.

To this Thorndike added the "Law of Exercise", that responses to situations will, ceteris paribus, be more connected to those situations in proportion to the frequency of past pairings between situation and response. Thorndike's paradigm was popularized and extended by B.F. Skinner (see, e.g., Skinner 1953) who stressed the notion not just of consequences but of reinforcement as the basis of forming associations.

For Skinner, a behavior would get associated with a situation according to the frequency and strength of reinforcement that would arise as a consequence of the behavior.

Since the days of Skinner, associative learning has come in many different variations. But what all varieties should share with their historical predecessors is that associative learning is supposed to mirror the contingencies in the world without adding additional structure to them (see section 9 for some examples of when supposedly associative theories smuggle in extra structure).

The question of what contingencies associative learning detects (that is, one's preferred analysis of what the associative relation R is), is up for debate and changes between theorists.

The final widely shared, though less central, property of associative learning concerns the domain generality of associative learning. Domain generality's prevalence among associationists is due in large part to their traditional empiricist allegiances: excising domain-specific learning mechanisms constrains the amount of innate mental processes one has to posit.

Thus it is no surprise to find that both Hume and Pavlov assumed that associative learning could be used to acquire associations between any contents, regardless of the types of contents they were. For example, Pavlov writes,

Associationism as a Theory of Mental Structure

Associative learning amounts to a constellation of related views that interprets learning as associating stimuli with responses (in operant conditioning), or stimuli with other stimuli (in classical conditioning), or stimuli with valences (in evaluative conditioning).Associative learning accounts raise the question: when one learns to associate

contents X and Y because, e.g., previous experiences with Xs and Ys instantiated R, how does one store the information that X and Y are associated? A highly contrived sample answer to this question would be that a thinker learns an explicitly represented unconscious conditional rule that states "when a token of x is activated, then also activate a token of y".

Instead of such a highly intellectualized response, associationists have found a natural (though by no means necessary, see section 4.2) complementary view that the information is stored in an associative structure.

An associative structure describes the type of bond that connects two distinct mental states. An example of such a structure is the associative pair salt/pepper. The associative structure is defined, in the first instance, functionally:

if X and Y form an associative structure, then, ceteris paribus, activations of mental state X bring about mental state Y and vice versa without the mediation of any other psychological states (such as an explicitly represented rule telling the system to activate a concept because its associate has been activated)

.In other words, saying that two concepts are associated amounts to saying that there is a reliable, psychologically basic causal relation that holds between them—the activation of one of the concepts causes the activation of the other. So, saying that someone harbors the structure salt/pepper amounts to saying that activations of salt will cause activations of pepper (and vice versa) without the aid of any other cognitive states.

Associative structures are most naturally contrasted with propositional structures. A pure associationist is opposed to propositional structures—strings of mental representations that

express a proposition—because propositionally structured mental representations have structure over and above the mere associative bond between two concepts.

Take, for example, the associative structure green/toucan. This structure does not predicate green onto toucan. If we know that a mind has an associative bond between green and toucan, then we know that activating one of those concepts leads to the activation of the other.

A pure associative theory rules out predication, for propositional structures aren't just strings of associations. "Association" (in associative structures) just denotes a causal relation among mental representations, whereas predication (roughly) expresses a relation between things in the world (or intentional contents that specify external relations).

Saying that someone has an associative thought green/toucan tells you something about the causal and temporal sequences of the activation of concepts in one's mind; saying that someone has the thought there is a green toucan tells you that a person is predicating greenness of a particular toucan (see Fodor 2003: 91–94, for an expansion of this point).

Associative structures needn't just hold between simple concepts. One might have reason to posit associative structures between propositional elements (see section 5) or between concepts and valences (see section 8). But none of the proceeding is meant to imply that all structures are associative or propositional—there are other representational formats that the mind might harbor (e.g., analog magnitudes or iconic structures; see Camp 2007; Quilty-Dunn forthcoming).

For instance, not all semantically related concepts are harbored in associative structures. Semantically related concepts may in fact also be directly associated (as in doctor/nurse) or they may not (as in horse/zebra; see Perea and Rosa 2002). The difference in structure is not just a theoretical possibility, as these different structures have different functional profiles: for example, conditioned associations appear to last longer than semantic associations do in subjects with dementia (Glosser and Friedman 1991).

Associationism in Social Psychology

Since the cognitive revolution, associationism's influence has mostly died out in cognitive psychology and psycholinguistics. This is not to say that all aspects of associative theorizing are dead in these areas; rather, they have just taken on much smaller, more peripheral roles (for example, it has often been suggested that mental lexicons are structured, in part, associatively, which is why lexical decision tasks are taken to be facilitation maps of one's lexicon).

In other areas of cognitive psychology (for example, the study of causal cognition), associationism is no longer the dominant theoretical paradigm, but vestiges of associationism still persist (see Shanks 2010 for an overview of associationism in causal cognition). Associationism is also still alive in the connectionist literature, as well as in the animal cognition tradition.

But the biggest contemporary stronghold of associationist theorizing resides in social psychology, an area which has traditionally been hostile to associationism (see, e.g., Asch 1962, 1969). The ascendance of associationism in social psychology has been a fairly modern development, and has caused a revival of associationist

theories in philosophy (e.g., Madva and Brownstein 2019). The two areas of social psychology that have seen the greatest renaissance of associationism are the implicit attitude and dual-process theory literature. However, in the late 2010s social psychology has begun to take a critical look at associationist theories (e.g., Mann et al. 2019).

Criticisms of Associationism

Associationism has been a dominant theme in mental theorizing for centuries. As such, it has garnered an appreciable amount of criticism.

Learning Curves

The basic associative learning theories imply, either explicitly or implicitly, slow, gradual learning of associations (Baeyens et al. 1995). The learning process can be summarized in a learning curve which plots the frequency (or magnitude) of the conditioned response as a function of the number of reinforcements (Gallistel et al. 2004: 13124). Mappings between CRs and USs are gradually built up over numerous trials (in the lab) or experiences (in the world). Gradual, slow learning has come under fire from a variety of areas (see sections 9.3 and 9.4.1).

However, here we just focus on the behavioral data. In a series of works re-analyzing animal behavior, Gallistel (Gallistel et al. 2004; Gallistel and King 2009) has argued that although group-level learning curves do display the properties of being negatively accelerated and gradually developing, these curves are misleading because no individual's learning curve has these properties. Gallistel has argued that learning for individuals is generally step-like, rapid, and abrupt.

An individual's learning from a low-level of responding to asymptotic responding is very quick. Sometimes, the learning is so quick that it is literally one-shot learning. For example, after analyzing multiple experiments of animal learning of spatial location Gallistel writes.

The Problem of Predication

The problem of predication is, at its core, a problem of how an associative mechanism can result in the acquisition of subject/predicate structures, structures which many theorists believe appear in language, thought, and judgment.

The first major discussion of the problem appears in Kant (1781/1787), but variants of the basic Kantian criticism can be seen across the contemporary literature (see, e.g., Chomsky 1959; Fodor and Pylyshyn 1988; Fodor 2003; Mandelbaum 2013a; for the details of the Kantian argument see the entry on Kant's Transcendental Argument).

For a pure associationist, association is "semantically transparent" (see Fodor 2003), in that it purports to add no additional structure to thoughts. When a simple concept, X and a simple concept Y, become associated one acquires the associative structure X/Y. But X/Y has no additional structure on top of their contents. Knowing that X and Y are associated amounts to knowing a causal fact: that activating Xs will bring about the activation of Ys and vice versa. However, so the argument goes, some of our thoughts appear to have more structure than this: the thought birds fly predicates the property of flying onto birds.

The task for the associationist is to explain how associative structures can distinguish a thinker who has a single (complex) thought birds fly from a thinker who conjoins two simple thoughts in an associative structure where one thought, birds, is immediately

followed by another, fly. As long as the two simple thoughts are reliably causally correlated so that, for a thinker, activations of birds regularly brings about fly, then that thinker has the associative structure birds/fly. Yet it appears that thinker hasn't yet had the thought birds fly.

The problem of predication is explaining how a purely associative mechanism could eventuate in complex thoughts. In Fodor's terms the problem boils down to how association, a causal relation among mental representations, can affect predication, a relation among intentional contents (Fodor 2003).

Against the Contiguity Analysis of Associationism

Contiguity has been a central part of associationist analyses since the British Empiricists. In the experimental literature, the problem of figuring out the parameters needed for acquiring an association due to the contiguity of its relata has sometimes been termed the problem of the "Window of Association" (e.g., Gallistel and King 2009).

Every associationist theory has to specify what temporal window two properties must instantiate in order for those properties to be associated. A related problem for contiguity theorists is that if the domain generality of associative learning is desired, then the window needs to be

homogenous across content domains. The late 1960s saw persuasive attacks on domain generality, as well as the necessity and sufficiency of the contiguity criterion in general.

Against the Necessity of Contiguity

Research on "taste aversions" and "bait-shyness" provided a variety of problems with contiguity in the associative learning tradition of

classical conditioning. Garcia observed that a gustatory stimulus (e.g., drinking water or eating a hot dog) but not an audiovisual stimulus (a light and a sound) would naturally become associated with feeling nauseated. For instance, Garcia and Koelling (1966) paired an audiovisual stimulus (a light and a sound) with a gustatory stimulus (flavored water).

The two stimuli were then paired with the rats receiving radiation, which made the rats feel nauseated. The rats associated the feeling of nausea with the water and not with the sound, even though the sound was contiguous with the water. Moreover, the delay between ingesting the gustatory stimulus and feeling nauseated could be quite long, with the feeling not coming on until 12 hours later (Roll and Smith 1972), and the organism needn't even be conscious when the negative feeling arises. (For a review, see Seligman 1970; Garcia et al. 1974).

The temporal delay shows that the CS (the flavored water) needn't be contiguous with the US (the feeling of nausea) in order for learning to occur, thus showing that contiguity isn't necessary for associative learning.

Gestalt perspectives on thought processes:

Gestalt psychology is a school of thought that looks at the human mind and behavior as a whole. When trying to make sense of the world around us, Gestalt psychology suggests that we do not simply focus on every small component.

Instead, our minds tend to perceive objects as part of a greater whole and as elements of more complex systems. This school of psychology played a major role in the modern development of the study of human sensation and perception.

Originating in the work of Max Wertheimer, Gestalt psychology formed partially as a response to the structuralism of Wilhelm Wundt.

While Wundt was interested in breaking down psychological matters into their smallest possible part, the Gestalt psychologists were instead interested in looking at the totality of the mind and behavior. The guiding principle behind the Gestalt movement was that the whole was greater than the sum of its parts.

The development of this area of psychology was influenced by a number of thinkers, including Immanuel Kant, Ernst Mach, and Johann Wolfgang von Goethe.

The development of Gestalt psychology was influenced in part by Wertheimer's observations one day at a train station. He purchased a toy stroboscope which displayed pictures in a rapid sequence to mimic the appearing movement. He later proposed the concept of the Phi phenomenon in which flashing lights in sequence can lead to what is known as apparent motion.[1]

In other words, we perceive movement where there is none. Movies are one example of apparent motion. Through a sequence of still frames, the illusion of movement is created.

"The fundamental 'formula' of Gestalt theory might be expressed in this way," Max Wertheimer wrote. "There are wholes, the behavior of which is not determined by that of their individual elements, but where the part-processes are themselves determined by the intrinsic nature of the whole. It is the hope of Gestalt theory to determine the nature of such wholes."

Gestalt is a decisive trend in psychology history. It was born in Germany at the beginning of the 20th century. It was Christian von

Ehrenfels, an Austrian philosopher, who gave this movement its name in The Attributes of Form, his most important work. There is no perfect English translation of the term “gestalt”. But we can interpret it as “totality”,”figure”,”structure”,”configuration” or “organized unity”.

“The whole is more than the sum of its parts” is its maximum. The main authors of Gestalt proposed alternatives to the dominant psychological paradigms and made great contributions to cognitive psychology.

This particular focus was a breath of fresh air and allowed people who did not feel represented by the main currents of psychology to find an alternative.

Gestalt Theory: Characteristics

- **Its main predecessors of gestalt theory are philosophers:** Thinkers such as Kant, Descartes or Husserl developed the theoretic basis on which this school developed. The psychologists belonging to this current were able to take their ideas to the laboratory and obtain amazing results.
- **We must treat people as a whole:** We cannot explore the different dimensions that shape us in isolation. A holistic approach is needed when speaking about mental health. **The complexity of the human mind cannot be reduced.** Gestalt theory explores the dynamic relationships that connect the various elements of reality. Gestalt theory does not conceive separating processes such as learning from memory.
- **We are active in understanding reality:** We do not all perceive reality, in the same way, we have our own vision. Each one structures the information they receive according to

their previous experiences. **Our mental representations do not correspond completely with those that exist in reality, we construct them ourselves.** We are also able to adapt our mental processes and contents as new situations arise.

- **They opposed the predominant schools in their time:** Gestalt theory psychologists did not agree with approaches such as behaviorism, which limits human behavior to associations between stigmas and responses. This perspective leaves mental processes aside and does not contemplate the potential of human intelligence. On the other hand, they did not adhere to psychoanalysts either, seeing people as passive agents without willpower.
- **Gestalt theory's main study area is perception:** Gestalt theorist focused especially on seeking simple and natural explanations that could be adapted to our natural way of perceiving reality. **Through perception, we are able to acquire knowledge of the world, interact with it and connect with others.**

Our senses and mental processes interact to allow us to perform tasks as varied as removing the hand from a burning surface or notice that the person speaking to us is upset by their frowning. **Gestalt theory focuses on visual perception.** However, their ideas have been adapted to fields such as music.

Gestalt psychologists are known for their contributions to the study of the learning process and problem-solving. However, their most relevant contribution, which was stated by Wertheimer, is the elaboration of some basic laws that govern our perception.

Information processing, Feature integration model

Basic Assumptions

The information processing approach is based on a number of assumptions, including:

(1) information made available by the environment is processed by a series of processing systems (e.g. attention, perception, short-term memory);

(2) these processing systems transform or alter the information in systematic ways;

(3) the aim of research is to specify the processes and structures that underlie cognitive performance;

(4) information processing in humans resembles that in computers.

The development of the computer in the 1950s and 1960s had an important influence on psychology and was, in part, responsible for the cognitive approach becoming the dominant approach in modern psychology (taking over from Behaviorism).

The computer gave cognitive psychologists a metaphor, or analogy, to which they could compare human mental processing. The use of the computer as a tool for thinking how the human mind handles information is known as the computer analogy.

Essentially, a computer codes (i.e., changes) information, stores information, uses information, and produces an output (retrieves info). The idea of information processing was adopted by cognitive psychologists as a model of how human thought works.

For example, the eye receives visual information and codes information into electric neural activity which is fed back to the brain

where it is “stored” and “coded”. This information is can be used by other parts of the brain relating to mental activities such as memory, perception and attention. The output (i.e. behavior) might be, for example, to read what you can see on a printed page.

Hence the information processing approach characterizes thinking as the environment providing input of data, which is then transformed by our senses. The information can be stored, retrieved and transformed using “mental programs”, with the results being behavioral responses.

Cognitive psychology has influenced and integrated with many other approaches and areas of study to produce, for example, social learning theory, cognitive neuropsychology and artificial intelligence (AI).

Information Processing and Selective Attention

When we are selectively attending to one activity, we tend to ignore other stimulation, although our attention can be distracted by something else, like the telephone ringing or someone using our name.

Psychologists are interested in what makes us attend to one thing rather than another (selective attention); why we sometimes switch our attention to something that was previously unattended (e.g. Cocktail Party Syndrome), and how many things we can attend to at the same time (attentional capacity).

One way of conceptualizing attention is to think of humans as information processors who can only process a limited amount of information at a time without becoming overloaded.

Broadbent and others in the 1950s adopted a model of the brain as a limited capacity information processing system, through which external input is transmitted.

Information processing models consist of a series of stages, or boxes,

which represent stages of processing. Arrows indicate the flow of information from one stage to the next.

- **Input** processes are concerned with the analysis of the stimuli.
- **Storage** processes cover everything that happens to stimuli internally in the brain and can include coding and manipulation of the stimuli.
- **Output** processes are responsible for preparing an appropriate response to a stimulus.

Critical Evaluation

A number of models of attention within the Information Processing framework have been proposed including:

Broadbent's Filter Model (1958), Treisman's Attenuation Model (1964) and Deutsch and Deutsch's Late Selection Model (1963).

However, there are a number of evaluative points to bear in mind when studying these models, and the information processing approach in general. These include:

1. The information processing models assume serial processing of stimulus inputs.

- **Serial processing** effectively means one process has to be completed before the next starts.
- **Parallel processing** assumes some or all processes involved in a cognitive task(s) occur at the same time.

There is evidence from dual-task experiments that parallel processing is possible. It is difficult to determine whether a particular task is processed in a serial or parallel fashion as it probably depends (a) on the processes required to solve a task, and (b) the amount of practice on a task.

Parallel processing is probably more frequent when someone is highly skilled; for example a skilled typist thinks several letters ahead, a novice focuses on just 1 letter at a time.

2. The analogy between human cognition and computer functioning adopted by the information processing approach is limited.

Computers can be regarded as information processing systems insofar as they:

(i) combine information presented with stored information to provide solutions to a variety of problems, and

(ii) most computers have a central processor of limited capacity and it is usually assumed that capacity limitations affect the human attentional system.

BUT -

(i) the human brain has the capacity for extensive parallel processing and computers often rely on serial processing;

(ii) humans are influenced in their cognitions by a number of conflicting emotional and motivational factors.

3. The evidence for the theories/models of attention which come under the information processing approach is largely based on experiments under controlled, scientific conditions.

Most laboratory studies are artificial and could be said to lack ecological validity.

In everyday life, cognitive processes are often linked to a goal (e.g. you pay attention in class because you want to pass the examination), whereas in the laboratory the experiments are carried out in isolation form other cognitive and motivational factors.

Although these laboratory experiments are easy to interpret, the data may not be applicable to the real world outside the laboratory. More recent ecologically valid approaches to cognition have been proposed (e.g. the Perceptual Cycle, Neisser, 1976).

Attention has been studied largely in isolation from other cognitive processes, although clearly it operates as an interdependent system with the related cognitive processes of perception and memory.

The more successful we become at examining part of the cognitive system in isolation, the less our data are likely to tell us about cognition in everyday life.

Feature Integration Theory

Feature Integration Theory was parent to a family of subsequent models. Many of these include the concept of guided search. In guided search, the information gathered about basic features can be used to guide attention toward likely targets. Thus, if an observer is looking for a red letter T, attention will be guided to red letters and not wasted on letters that could never be the target (Wolfe, J. M., 1994). In two-stage modeling, critical questions include the nature of the stimulus attributes that can be processed prior to attentional selection as discussed earlier. Some attributes, like color and orientation clearly fall into the preattentive category. The more interesting and problematic cases are complex and/or learned classes of stimuli like faces and letters.

All models must resolve issues about the nature of selection. What is selected? If objects are selected, how are objects parsed from the background prior to selection? What are the limits on selection? Can more than one item be selected at one time? What does selection do? Does it enhance processing? Does it enable different types of processing?

Binding by Attention

Anne Treisman's Feature Integration Theory (FIT), developed in the context of visual search tasks, postulates that the correct binding of object features requires visual attention. Treisman starts from the assumption that the visual system is equipped with a set of ‘feature maps,’ with a different map for every conceivable feature (e.g., ‘red,’ ‘green,’ ‘square,’ ‘circular’). These feature maps are connected to a ‘master map of locations,’ which encodes the exact positions of objects in visual space (**Figure 4**). When the search target is defined by a single feature, for example, ‘red,’ one only has to monitor the respective feature map and trace its activation to the target's position on the master map. This is what occurs in parallel

search when the target seems to 'pop out' of the display (see 'Empirical evidence for binding problems in visual perception' section). However, when the target is defined by a conjunction of features, it is necessary to employ visual attention. Each object location on the master map has to be scanned by a 'spotlight' of attention, and for each of these positions the single features have to be collected from the feature maps and bound into an 'object file' that can be compared with a target template stored in working memory. As soon as the current object file matches the target template, the object has been found, and the search is terminated. Because the sequential scanning of object positions is a time-consuming process that depends on the number of positions to be covered, this model can explain serial search.

Feature Integration Theory

Anne Treisman's Feature Integration Theory (FIT), first proposed in 1980, holds that attention is critical to the formation of bound representations of objects and, by extension, it proposes that attention is critical to our conscious experience of those bound representations. In FIT, following the understanding of visual neurophysiology given above, the visual system first decomposes the visual scene into its composite features, arrayed in a set of "feature maps." The pre-attentive description of a scene or object comprises a list of such features. The term "pre-attentive" has been controversial but it can be operationally defined here as the representation of a stimulus before selective attention is directed to that stimulus.

In FIT, the approximate position of each feature is recorded on its pre-attentive feature map. For example, if the visual scene contains two red objects, the feature map corresponding to redness would be activated at two points roughly corresponding to the locations of the

red objects. If each feature were associated with a precise region in space, this might solve the binding problem. Features that correspond to the same region in space could be automatically conjoined thus guaranteeing veridical perception. Unfortunately, the location of many features is measured in an imprecise fashion. For example, the smallest receptive fields in IT, the region whose activity correlates well with shape perception, have a spatial extent of a few degrees of visual angle. Within this region, the cell will respond to an object in an approximately translation invariant manner. Thus, a neuron in IT cannot signal the location of a particular shape with a precision of better than a few degrees, while the perception of coherent objects requires a much finer resolution.

Because of the poor resolution of these feature maps, if two objects are close together, then there is the potential that the features from one object may become conjoined with the features of the other object thus creating a percept of an object that did not in fact exist. For example, if the visual scene contains a red vertical bar and a blue horizontal bar then one might see a blue vertical bar and a red horizontal bar. Such inappropriate combinations of features are known as illusory conjunctions. FIT suggests that attention hinders the formation of illusory conjunctions.

Supporting this assertion is a series of classic experiments by Treisman and her colleagues showing that, if attention is occupied elsewhere, illusory conjunctions are, in fact, reported. In one version of the experiment, observers viewed a display of five characters aligned horizontally.

The outer two characters were always digits and the inner three characters were always letters. While the digits were always black, the letters were colored. The observer's primary task was to name the digits. After doing that, the observer reported the letters and

their associated colors. When the display was presented sufficiently rapidly, observers would often report seeing an incorrect conjunction of a color and a letter. For example, if the display contained a red X and a green T, they might report seeing a red T.

Crucially, these illusory conjunctions occurred at a much higher rate than could be attributed to the observer simply misperceiving a given feature. Generally, the observer correctly perceived the features present in the display. It was the conjoining of features that proved to be problematic.

When asked to report how confident they were that they had actually seen an object, observers were just as confident when they reported seeing an illusory conjunction as they were when they correctly reported the features of an object. Indeed, although all observers were told that the digits would always be black (and in fact always were) about half the observers spontaneously reported that the digits sometimes appeared to be colored, sometimes even going as far as to argue with the experimenter about the issue!

This raises an interesting problem in the study of attention and awareness. In tasks of this sort, one can only ask about what was seen, after the fact. If one asks about the current status of a visible object, the observer will attend to it in order to answer the question and will be unable to give an accurate report of the unattended state. Nevertheless,

the phenomenology of illusory conjunctions does show that, within a fraction of a second of the disappearance of a display, observers can be quite convinced that they have seen something that was not, in fact, present. Subsequent studies have shown that illusory conjunctions can be perceived even when the subject attends to the

objects, especially if the objects are perceptually grouped. Clearly, attention does not always succeed in solving the binding problem.

There is neuropsychological evidence, from studies of patients with Balint's syndrome, which supports the idea that attention can inhibit the formation of illusory conjunctions. This syndrome occurs when both the left and right parietal lobes are damaged. As these areas help govern the deployment of attention, such patients have great difficulty in directing their attention to a given object, resulting in the inability to perceive more than one object at a time. As would be expected, they are also prone to suffer from illusory conjunctions, experiencing them even when the image is displayed for several seconds.

Neurophysiological support also comes from work by Robert Desimone and colleagues. They performed a series of extracellular studies in area V4 of the macaque monkey that have shown that attention can help solve the binding problem. First they would find a stimulus that, when presented on its own, would elicit a strong response from the neuron in question (the preferred stimulus), and another that would elicit only a weak response (the non-preferred stimulus).

They would then present both stimuli simultaneously so that they both were within the neuron's receptive field. In the absence of attention, the cell would simultaneously respond to both stimuli, with its response (spike rate) lying between that generated by each stimulus when presented on its own. In other words, the response reflected contributions from both stimuli, meaning that the cell could not distinguish between the two. However, when the monkey attended to one of the stimuli, the situation changed and the cell responded primarily to the attended stimuli.

Specifically, when the monkey attended to the preferred stimulus, the cell would respond strongly, but when the non-preferred stimulus was attended, only a weak response was elicited. In this case, attention was able to solve the binding problem, at least at the neuronal level, by shrinking the receptive field of the cell to include just the selected item, thereby removing the influence of the unattended item.

This constriction of the receptive field does not explain how signals about one feature analyzed in one cortical area can be bound to signals about another feature from another area. Other mechanisms have been suggested to account for this aspect of binding.

Several of these are based on the idea that neurons in different cortical areas that respond to the same object synchronize their activity, so that they create action potentials at the same time. Consequently, a third brain area could determine whether two neurons in two different parts of the brain are responding to different features of the same object by being sensitive to this synchrony.

As attention is known to increase neural synchrony, theories based on synchrony are consistent with the notion that attention is needed to solve the binding problem.

An alternative theory put forward by Edward Vul and Anina Rich suggests that features are not directly bound together but rather are consciously perceived as being bound when they are perceived to share a location in space and time. Attending to a feature allows it to be more precisely localized, thereby increasing the chances that the correct features are perceived together and decreasing the chances of illusory conjunctions forming.

Thus they propose that attention solves the binding problem only in an indirect fashion by increasing the precision by which features can be localized in space and time.

Concept formation: Rules, Types

Concept formation, process by which a person learns to sort specific experiences into general rules or classes. With regard to action, a person picks up a particular stone or drives a specific car. With regard to thought, however, a person appears to deal with classes. For instance, one knows that stones (in general) sink and automobiles (as a class) are powered by engines. In other words, these things are considered in a general sense beyond any particular stone or automobile.

Awareness of such classes can help guide behaviour in new situations. Thus two people in a bakery may never have met before, but, if one can be classified as customer and the other as clerk, they tend to behave appropriately. Similarly, many people are able to drive almost any automobile by knowing how to drive a specific automobile.

The term concept formation describes how a person learns to form classes, whereas the term conceptual thinking refers to an individual's subjective manipulation of those abstract classes. A concept is a rule that may be applied to decide if a particular object falls into a certain class. The concept "citizen of the United States" refers to such a decision rule, meaning any person who was born in U.S. territory or who is a child of a U.S. citizen or who has been legally naturalized. The rule suggests questions to ask in checking

the citizenship of any particular individual. As most concepts do, it rests on other concepts; “U.S. citizen” is defined in terms of the concepts “child” and “territory.” Many scientific or mathematical concepts cannot be understood until the terms by which they are defined have been grasped. In this way concept formation builds on itself.

Conceptual classification may be contrasted with another type of classification behaviour called discrimination learning. In discrimination learning, objects are classified on the basis of directly perceived properties such as physical size or shape. The emphasis on concrete physical features in discrimination learning can be contrasted with the more abstract nature of concept formation. When a stimulus is perceived to match several different past experiences, however, the response may be a compromise, because an object need not bear an all-or-none relation to a set of others in discrimination learning; for example, there is no absolute distinction between tall and short people.

While human beings are capable of abstract thought, many of the classifications people make seem to be concrete discriminations. For example, people may use the same term in a discriminative or conceptual way. A child might use the term policeman in discriminating a man who wears a distinctive uniform, while a lawyer may use the term to represent a civil servant charged with enforcing criminal codes. In practice, people seem to think in ways that combine abstractness and concreteness. They also may blend class membership with assignment along a scale—e.g., such concepts as leadership, an abstract quality that people are said to exhibit in varying degrees. The same would apply to vivacity, avarice, and other personality traits.

People seem to develop more-complex sets of classes than do other animals, but this does not necessarily mean that human modes of learning are unique. It may be that all animals have the same basic biochemical machinery for learning but human animals exhibit it in greater variety. Yet, it seems no more appropriate to account for human concept formation in terms of discrimination learning alone than it does to reduce the functions of a piston engine to chemical reactions.

Age And Conceptual Behaviour

Piaget's observations

Through clinical observations, Swiss psychologist Jean Piaget initiated considerable study of how young children learn concepts that help them cope with their physical surroundings. As models for defining feasible change, concepts are at least as important in such contexts as they are for classification. Piaget stressed that infants must first learn to distinguish themselves from the external environment.

Next they form understandings of the physical world (for example, identifying objects that fall) that allow further exploration of the world. Later in the preschool period, children grasp the concept of spatial localization—objects that are separated in space. Piaget characterized this period of learning as classifying objects only on the basis of perceptually attractive, concrete physical features (in agreement with laboratory studies of intradimensional and extradimensional shift).

He and others who used his methods reported that preschool children are apt to explain external change in terms of their own needs: a four-year-old is likely to say that a cloud moves "because the sun is in my eyes." Among children in early primary grades,

other interpretations of cause and effect might be expressed by saying a moving cloud "wants to hide the sun." In later primary grades, volitional and passive movement usually become conceptually distinct. By adolescence, children develop an ability to deal analytically with objects apart from their immediate perceptual characteristics. This marks an understanding of the hierarchies of subclasses within more general classes—for example, a normal child of eleven applies the properties of all living things to the class called birds.

Given proper information, by the age of six many children display significant concept-forming abilities. They ordinarily have considerable linguistic competence, using (though often not being able to explain) such abstract qualifications as present and past tense. Rules of formal logic (such as "new math") can be taught in the elementary grades. Progressive use of abstract concepts seems to reflect both maturation and learning.

Aging

It is generally thought that the potential for learning new abstractions tends to decrease in old age and that in extreme cases (such as senility, severe alcoholism, or brain injury) the deficit is dramatic. Much less is known, however, about changes in conceptual ability during the active period of adult life, in part because much of the evidence is conflicting.

Concept Formation In Animals

Rats learn to enter lighted or unlighted alleys to get food, and goldfish can be taught to swim toward or away from an object. In such discrimination learning, the animal is said to associate a physical property of the stimulus with its response, and with some contingency of reward or punishment. Thus, while a dog can

be trained to come when called, it need not mean that he knows his name in the same sense that a man apparently does.

Most animals show classification behaviour that seems indicative of discrimination learning. A crow will respond to the danger call of a bird of another species—but only if that call resembles the crow's. Chimpanzees, however, which have been observed using sticks as primitive tools, behave as if they have a concept of things that extend reach. Based on considerable evidence of this sort, many are reluctant to say that animals are incapable of abstract thinking.

Most studies aimed at evidence of concept formation among laboratory animals have involved primates, although there are reports of abstract behaviour among other animals such as dogs, dolphins, pigs, and parrots. Monkeys have been taught to solve the oddity problem: presented with two objects of one kind and one of another, they can be trained to select the discrepant one. This behaviour persists even for sets of objects that have never been presented to them before.

The animals behave as if they grasp the general concept of similarity, which is an abstraction rather than a simple discrimination. Animals also have been tested on the ability to learn languages.

With great effort, chimpanzees have been taught to "speak" (through physical gestures) and to use correctly a very few words. A much more successful attempt was made by Beatrice and Allan Gardner to teach a chimpanzee, Washoe, the sign language used by deaf people—the gestures of this language apparently being more appropriate to the anatomic structure of chimpanzees.

The chimpanzee learned to use the signs for hat, dog, food, yes, me (self), sorry, funny, go, come, and many others. Washoe's foster

son learned 68 words simply through observation, while Washoe's companions learned to use sign language to communicate transactions and reassurance. They also taught others the concepts they had learned.

Concept Formation By Machine

Computers can be programmed to process information and to develop classification rules (e.g., they can play chess and make decisions about business or military problems; see artificial intelligence). Essentially, such devices are programmed to mimic the processes of human problem solving. In this sense, machines have formed concepts; but their functions remain relatively impoverished.

Efficient linguistic behaviour has proved particularly difficult to produce in a machine. While many believe that human thinking can be explained mechanistically in physiological terms, scientists themselves have yet to develop concepts adequate for producing machines that can approach the full range of human talent. Machine translation of language, however, has shown some success.

A Computational Metaphor for the Mind We can imagine the human mind as an evolving store of knowledge, which constantly updates itself from new information built from previous information through some kind of reasoning. In this model, the problems, events, or feelings, et cetera, of which we are consciously aware at any given time trigger a partly, or wholly, unconscious search through the knowledge store for those pieces of information that relate to the problem.

Once found, these pieces of information permit the inference of new knowledge. For instance, a rule that is appropriate for modeling the

formation of the new knowledge might look roughly as follows: c1, c2, …cn Æ newc .

(1) Here ci and newc are concepts expressed as logic atoms. We call these rules concept formation rules. Occasionally, we may need to test some condition before being able to form a new concept. For example, consider the knowledge that if the speed limit is X and our car's velocity is Y, then we will likely receive a speeding ticket if Y is greater than X. If we also know that we are traveling at

100km/hour and the speed limit is 50km/ hour, then we might form the new concept that it is likely we will receive a speeding ticket. In other words, using a primitive (i.e., system-defined) unary atom test, whose argument contains the test to be performed, we can model the above conceptformation rule as the following: speed_limit(X), current_speed(Y) => test(Y>X), speeding_ticket(likely) .

(2) We next examine each feature that our concept-formation paradigm must have in order to

a) constitute an adequate, constructivist metaphor for the workings of the human mind,

b) provide some of the flexibility exhibited in human reasoning, and

c) be directly executable.

Information Selection Most of the rules in our knowledge store will be irrelevant to the situation at hand, so the first problem in our model, and in constructivism in general, is the problem ofselecting the appropriate information in order to form new concept(s) (which are actually relevant to the problem).

We solve this by using a system that constantly searches for any information that may match the new information (i.e., the initial

problem's concepts, or the concepts formed while attempting a solution) and consequently triggers those rules whose left-hand side at least partially matches some of the new information.

If we consider our previous example, then as soon as the new information that the speed limit is 50km/hr and the current speed is 100km/hr arrives in the knowledge store, a search through that store is initiated which ultimately yields rule (2), whose left hand side will be matched with unifier {X=50, Y=100}. The unifier will apply to the rest of the rule as well, and a test to see whether 100 > 50 will be performed. Since the test will succeed, the new information speeding_ticket(likely) will be added to the knowledge store.

Flexible Concept Formation Binary logic is notoriously insufficient for modeling the human mind. The main alternatives are based either on probabilistic or fuzzy reasoning. As pointed out in [4], although probability theory is appropriate for measuring randomness of information,

it is inappropriate for measuring the meaning of information. For many applications, measuring vagueness (e.g. through a membership function that measures the "degree" to which an element belongs to a set) is more important than measuring randomness. While the fuzzy set approach has successfully overcome some of the problems with probabilistic reasoning,

it relies on fairly detailed comparative knowledge of the domain being described. Not only must one say that Tom is tall, for instance, but one must also state specifically to what degree. Here we propose a simpler model based on properties between concepts. Vagueness can be expressed by relaxing the properties between concepts in accordance with a user's criteria.

The criteria can be flexibly and modularly adjusted for experimental purposes while still maintaining direct executability. For our model described so far, we need only introduce the following enhancement.

That is, rather than inflexibly allowing a concept to be formed if a test succeeds while disallowing its formation if that test fails, we instead denote those tests which we wish to make flexible as properties. Properties are like any other test, except that their failure does not necessarily result in the failure of the rule itself. Rather, the concept will still be formed and two lists will be associated with it: a list of the properties that the concept satisfies, S, and a list of those that it violates, V.

This allows us to construct possibly incorrect or incomplete concepts while collecting the information as to what way they are not totally justified. The user then has all the information pertaining to the construction of a particular concept and can interpret these results in a much more informed, holistic way. This is in contrast to the blind computation of the degree of randomness or vagueness from those assigned a priori to each individual piece of the reasoning puzzle.

In other cases, however, it will be more appropriate for the new concepts to replace the concepts that led to it. For instance, imagine a rule which uses the concept that a teacher is free at time T and that a parent is free at the same time T in order to add the concept that a meeting between these two individuals should be scheduled for time T. Obviously, once a meeting at time T has been arranged between them, they can no longer be considered as free at that time. Yet another type of rule is needed to remove redundant concepts such as “John must meet Alice at six” and “Alice must meet John at six”. In this paper we primarily use the first type of

rule, but all three types maintain computational counterparts within our model.

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Flexible Concept Formation

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Transforming the Knowledge Store Just as rule selection follows automatically from the system's normal search for applicable rules, the transformation of the knowledge store is achieved as a side

effect of the system's normal procedure of applying a concept formation rule. In some cases the newly formed concepts will need to coexist with the concepts that participated in their formation, such as when forming a concept based on some transitive property. In other cases, however, it will be more appropriate for the new concepts to replace the concepts that led to it. For instance, imagine a rule which uses the concept that a teacher is free at time T and that a parent is free at the same time T in order to add the concept that a meeting between these two individuals should be scheduled for time T. Obviously, once a meeting at time T has been arranged between them, they can no longer be considered as free at that time. Yet another type of rule is needed to remove redundant concepts such as "John must meet Alice at six" and "Alice must meet John at six". In this paper we primarily use the first type of rule, but all three types maintain computational counterparts within our model. 2.4 Making Decisions It is also interesting to note that decisions also follow from the normal operation of the rules. That is, depending on which of the currently considered concepts matches which rule, the decision on the appropriate rule to trigger is made, determining which new concepts will be formed. Newly added concepts then help further trigger rules, and so on until a solution is found or no new, useful, concepts can be constructed. 2.6 Cognitive Structure Cognitive structure (such as schemas or mental models) provides meaning and organization to experiences and allows individuals to draw conclusions beyond the information actually given. In our model, cognitive structure is provided by the rules themselves. The properties that are required between the concepts a given rule is trying to relate are particularly important, both for the formation of new concepts and achieving human-like flexibility

Concept Formation Programs/Grammars

It is clear that CHRs can provide most of the features needed for a computational incarnation of our concept formation rules model: - Information selection is a side effect of the CHR engine's search over applicable rules. –

The transformation of information takes place automatically when a rule triggers, in the way sanctioned by the rule (namely, propagation rules update the knowledge store with the concept newly formed). - Hypotheses can be made through assumptions. In addition, we need to provide flexible cognitive structure through relaxable, directly executable properties between concepts.

This is achieved through concept formation rules, which have the same general form as CHR rules except that the guard may include any number of property calls for properties that have been defined by the user.

These calls are automatically handled by the system, provided that the user defines the properties as follows: a) A property must be named and defined through the binary predicate prop/2, whose first argument is the property's name and whose second argument is the list of arguments that are involved in checking the property and signaling the results.

Scheduled Meetings Consider the problem of scheduling meeting events between two groups of people given the availability of each person and the specific individuals that must meet. Regular scheduling software systems typically work in stages. The schedule is partially assigned until it reaches a meeting that it cannot schedule. By re-shuffling the other meetings that have already been scheduled, it is then often possible to open up matching timeslots for the individuals in question. Our concept formation framework

allows us to produce a higher-level solution in a concise and effective manner.

Conclusions

We have shown a powerful yet relatively simple cognitive model for concept formation inspired by constructivism. The methodology we present for implementing directly executable concept formation paradigms generalizes parsing methods we have developed specifically for natural language processing [6].

We have discussed our methodology for a directly executable, CHR-based rendition of this model, and exemplified its promise through two examples: (time) resource allocation, and error detection and correction. Other approaches need considerable more apparatus to solve the same problem (for example, [7] uses a fairly involved abductive model based on CHRGs for error detection and correction in string processing problem domains). We are also currently working on applying concept formation to the problem of identifying biomarkers in cancer diagnosis systems[8].

Strategies; Role of concepts in thinking

As discussed in the previous section, you may recall that the potential for creative thinking is in all of us. It is not limited to a few talented artists or scientists or to a chosen few. The expression of creative thinking may vary from individual to individual. Although hereditary factors are important in determining the extent to which one can be creative, environmental factors facilitate or hamper the development of creative thinking abilities.

Research in different countries including India has shown a slump in the level of creative thinking of school children at different stages due to environmental factors. On the other hand, research also

indicates that children from lower socio-economic groups, ethnic and minority groups have substantial untapped creativity and that they are creative in many different ways.

Research has also shown that all of us can make better use of our abilities for creative thinking through practice and training. We can become more imaginative, flexible, and original in solving day-to-day problems creatively and effectively. Development of creative thinking is important for one's personal growth and fulfilment.

Barriers to Creative Thinking

The first step in developing creative thinking is to identify inhibiting factors that impede creative expression and then make conscious attempts to overcome the same. As we are discussing, you may analyse how you approach your tasks and problems.

There are blocks to creative thinking which can be categorised as habitual, perceptual, motivational, emotional, and cultural. Although much habitual learning is necessary for smooth and efficient functioning within the daily routine, the tendency to be overpowered by habits particularly in one's ways of thinking.

Strategies for Creative Thinking

Research on characteristics of creative people has revealed that there are certain attitudes, dispositions, and skills which facilitate creative thinking. Here are some strategies to help you enhance your creative thinking abilities and skills:

• Become more aware and sensitive to be able to notice and respond to feelings, sights, sounds, textures around you. Spot problems, missing information, anomalies, gaps, deficiencies, and so on. Try to notice contradictions and incompleteness in situations that others may not do. For this, cultivate the habit of wider reading,

exposure to a variety of information, and develop the art of asking questions, pondering over the mysteries of situations and objects.

• Generate as many ideas, responses, solutions or suggestions on a given task or situation to increase your flow of thoughts.

Try deliberately to look for multiple angles of a task and situation to increase flexibility in your thinking. It could be, for example, thinking of alternative arrangements of furniture in a room to generate more space, differentways of conversing with people, looking for costs and benefits of a course of study or career, looking for ways of dealing with an angry friend, helping others, etc.

• Osborn's Brainstorming technique can be used to increase fluency and flexibility of ideas to open-ended situations. Brainstorming is based on the principle that producing ideas should be kept separate from the evaluation of their worth. The basic assumption is to let the minds think freely and the tendency to put judgment on the worth of ideas may be postponed,

i.e. imagination should be given priority over judgment till all the ideas are exhausted. This helps in increasing the fluency of ideas and piling up alternatives. Brainstorming can be practised by playing brainstorming games with family members and friends keeping its principles in mind. Use of checklists and questions often provide a new twist for ideas like, What other changes? What else? In how many ways could it be done? What could be the other uses of this object? and so on.

• Originality can be developed by practicing fluency, flexibility, habit of associative thinking, exploring linkages, and fusing distinct or remote ideas. A creative thinker, it is said, may not evolve new ideas but evolve new combination of ideas. It is the chain of

thoughts and cross-fertilisation of ideas that may bring out something new.

The idea of the 'rocking chair' has come from the combination of 'chair' and 'seesaw'. Practice making unusual and unexpected associations using analogies. Sometimes finding original ideas/solutions requires a dramatic shift of focus which can be facilitated by asking oneself : what is the opposite of the commonplace or usual solution to the problem? Allow conflicting thoughts to co-exist. Looking for solutions opposite to the obvious may lead to original solutions.

• Engage yourself more frequently in activities which require use of imagination and original thinking rather than routine work according to your interest and hobbies. It may be decorating the house, improvising or redesigning of old objects, making use of waste products in multiple ways, completing incomplete ideas in unique ways, giving new twist to stories or poems, developing riddles, puzzles, solving mysteries and so on.

• Never accept the first idea or solution. Many ideas die because we reject them thinking that the idea might be a silly idea. You have to first generate a number of possible ideas or solutions, then select the best from among them.

• Get a feedback on the solutions you decide on from others who are less personally involved in the task.

• Try to think of what solutions someone else may offer for your problems.

• Give your ideas the chance to incubate. Allowing time for incubation between production of ideas and the stage of evaluation of ideas, may bring in the 'Aha!' experience.

• Sometimes ideas cluster like branches of a tree. It is useful to diagram your thinking so that you can follow each possible branch to its completion.

• Resist the temptation for immediate reward and success and cope with the frustration and failure. Encourage selfevaluation. • Develop independent thinking in making judgments, figuring out things without any help or resources.

• Visualise causes and consequences and think ahead, predicting things that have never happened, like, suppose the time starts moving backwards, what would happen?, If we had no zero?, etc.

• Be aware of your own defenses concerning the problem. When we feel threatened by a problem we are less likely to think of creative ideas.

• Last but not the least, be self-confident and positive. Never undermine your creative potential. Experience the joy of your creation.

Types of Reasoning

Reasoning is the process of using existing knowledge to draw conclusions, make predictions, or construct explanations. Three methods of reasoning are the deductive, inductive, and abductive approaches.

Deductive reasoning: conclusion guaranteed
Deductive reasoning starts with the assertion of a general rule and proceeds from there to a guaranteed specific conclusion. Deductive reasoning moves from the general rule to the specific application: In

deductive reasoning, if the original assertions are true, then the conclusion must also be true.

Assuming the propositions are sound, the rather stern logic of deductive reasoning can give you absolutely certain conclusions. However, deductive reasoning cannot really increase human knowledge (it is nonampliative) because the conclusions yielded by deductive reasoning are tautologies-statements that are contained within the premises and virtually self-evident. Therefore, while with deductive reasoning we can make observations and expand implications, we cannot make predictions about future or otherwise non-observed phenomena.

Inductive reasoning: conclusion merely likely
Inductive reasoning begins with observations that are specific and limited in scope, and proceeds to a generalized conclusion that is likely, but not certain, in light of accumulated evidence. You could say that inductive reasoning moves from the specific to the general. Much scientific research is carried out by the inductive method: gathering evidence, seeking patterns, and forming a hypothesis or theory to explain what is seen.

Conclusions reached by the inductive method are not logical necessities; no amount of inductive evidence guarantees the conclusion. This is because there is no way to know that all the possible evidence has been gathered, and that there exists no further bit of unobserved evidence that might invalidate my hypothesis.

Because inductive conclusions are not logical necessities, inductive arguments are not simply true. Rather, they are cogent: that is, the evidence seems complete, relevant, and generally convincing, and

the conclusion is therefore probably true. Nor are inductive arguments simply false; rather, they are not cogent.

It is an important difference from deductive reasoning that, while inductive reasoning cannot yield an absolutely certain conclusion, it can actually increase human knowledge (it is ampliative). It can make predictions about future events or as-yet unobserved phenomena.

For example, Albert Einstein observed the movement of a pocket compass when he was five years old and became fascinated with the idea that something invisible in the space around the compass needle was causing it to move. This observation, combined with additional observations (of moving trains, for example) and the results of logical and mathematical tools (deduction), resulted in a rule that fit his observations and could predict events that were as yet unobserved.

Abductive reasoning: taking your best shot

Abductive reasoning typically begins with an incomplete set of observations and proceeds to the likeliest possible explanation for the set. Abductive reasoning yields the kind of daily decision-making that does its best with the information at hand, which often is incomplete.

A medical diagnosis is an application of abductive reasoning: given this set of symptoms, what is the diagnosis that would best explain most of them? Likewise, when jurors hear evidence in a criminal case, they must consider whether the prosecution or the defense has the best explanation to cover all the points of evidence. While there may be no certainty about their verdict, since there may exist additional evidence that was not admitted in the case, they make their best guess based on what they know.

While cogent inductive reasoning requires that the evidence that might shed light on the subject be fairly complete, whether positive or negative, abductive reasoning is characterized by lack of completeness, either in the evidence, or in the explanation, or both. A patient may be unconscious or fail to report every symptom, for example, resulting in incomplete evidence, or a doctor may arrive at a diagnosis that fails to explain several of the symptoms. Still, he must reach the best diagnosis he can.

Language and Thought

Till now, we have discussed the nature and meaning of thinking and how thinking is based on images and concepts. We have also discussed the various processes of thought. Throughout the discussion did you feel that words or language are essential to express what we think? This section examines the relationship between language and thought: that language determines thought, that thought determines language, and that thought and language have different origins. Let us examine these three viewpoints in some detail.

Language as Determinant of Thought

In Hindi and other Indian languages we use a number of different words for various kinship relationships. We have different terms for mother's brother, father's elder brother, father's younger brother, mother's sister's husband, father's sister's husband, and so on. An English person uses just one word uncle to describe all these kinship relationships. In the English language there are dozens of words for colours whereas some tribal languages have only two to

four colour terms. Do such differences matter for how we think? Does an Indian child find it easier to think about and differentiate between various kinship relationships compared to her Englishspeaking counterpart? Does our thinking process depend on how we describe it in our language? Benjamin Lee Whorf was of the view that language determines the contents of thought. This view is known as linguistic relativity hypothesis. In its strong version, this hypothesis holds what and how individuals can possibly think is determined by the language and linguistic categories they use (linguistic determinism). Experimental evidence, however, maintains that it is possible to have the same level or quality of thoughts in all languages depending upon the availability of linguistic categories and structures. Some thoughts may be easier in one language compared to another.

Thought as Determinant of Language The noted Swiss psychologist, Jean Piaget believed that thought not only determines language, but also precedes it. Piaget argued that children form an internal representation of the world through thinking. For example, when children see something and later copy it (a process called imitation), thinking does take place, which does not involve language. A child's observation of other's behaviour and imitation of the same behaviour, no doubt involves thinking but not language. Language is just one of the vehicles of thinking.

As actions become internalised, language may affect children's range of symbolic thinking but is not necessary for the origins of thought. Piaget believed that though language can be taught to children, understanding of the words require knowledge of the underlying concepts (i.e. thinking). Thus, thought is basic, and necessary if language is to be understood. Different Origins of Language and Thought The Russian psychologist, Lev Vyogotsky,

argued that thoughts and language develop in a child separately until about two years of age, when they merge. Before two years thought is preverbal and is experienced more in action (Piaget's sensory motor stage).

The child's utterances are more automatic reflexes - crying when uncomfortable - than thoughtbased. Around two years of age, the child expresses thought verbally and her/his speech reflects rationality. Now children are able to manipulate thoughts using soundless speech. He believed that during this period the development of language and thinking become interdependent; the development of conceptual thinking depends upon the quality of inner speech and vice versa. Thought is used without language when the vehicle of thinking is non-verbal such as visual or movementrelated. Language is used without thought when expressing feelings or exchanging pleasantries, for example "Good morning! How are you?" "Very well,

Meaning and Nature of Language

In the previous section we discussed the relationship between language and thought. In this section, we will examine how human beings acquire and use language in different age groups. Think for a moment: what would have happened if you did not have a language to express whatever you wanted to say? In the absence of language you will not be able to communicate your ideas and feelings, nor will you have the opportunity to know or have access to what others think and feel.

As a child when you first started saying "ma..ma..ma.", it not only gave you tremendous boost to continue repeating this activity but also was a great moment of joy for your parents and other care-givers. Slowly you learnt to say 'ma' and 'papa' and sometime later

combined two or more words to communicate your needs, feelings, and thoughts. You learnt words appropriate for situations and also learnt the rules of putting these words in sentences.

Initially you learnt to communicate in the language being used at home (usually the mother-tongue), went to school and learnt the formal language of instruction (in many cases this language is different from the mothertongue), and were promoted to higher grades and learnt other languages. If you look back, you will realise that your journey from crying and saying “ma..ma..ma” to the attainment of mastery in not one but many languages, has been a fascinating one. In this section we shall be discussing the salient features of language acquisition.

You have been using language all your life. Now try to define accurately what it is that you have been using. Language consists of a system of symbols organised by means of certain rules that we use to communicate with each other. You will notice that language has three basic characteristics: (a) the presence of symbols, (b) a set of rules to organise these symbols, and (c) communication.

Here we shall be discussing these three characteristics of language. The first characteristic of language is that it involves symbols. Symbols represent something or someone else, for example, the place where you live is called ‘home’, the place where you study is called ‘school’, the thing that you eat is called ‘food’. Words like home, school, food, and numerous other words do not in themselves carry any meaning. When these words are associated with some objects/ events they attain meaning and we begin recognising those objects/events, etc. with particular words (symbols). We use symbols while thinking.

The second characteristic of language is that it involves rules. While combining two or more words we usually follow a definite and accepted order of presenting these words. For example, one would most likely say “I am going to school” and not “school am going I”. The third characteristic of language is that it is used for communicating one’s thought, ideas,

Development of Language Language

is a complex system and unique to human beings. Psychologists have tried to teach sign language, use of symbols to chimpanzees, dolphins, parrots, etc. But it is observed that, human language is more complex, creative, and spontaneous than the system of communication other animals can learn. There is also a great deal of regularity with which children all over the world seem to be learning the language or languages to which they are exposed. When you compare individual children, you find that they differ a

intentions, and feelings to others. On many occasions we communicate through the use of our body parts, called gestures or postures. This type of communication is called non-verbal communication. Some people who cannot use oral speech, like the ones with severe hearing and speech problems, communicate through signs. Sign language is also a form of language.

great deal in the rate of their language development as well as in how they go about it. But when you take a general view of children’s acquisition of language all over the world you find some predictable pattern in which children proceed from almost no use of language to the point of becoming competent language users.

Language develops through some of the stages discussed below. Newborn babies and young infants make a variety of sounds, which gradually get modified to resemble words. The first sound produced

by babies is crying. Initial crying is undifferentiated and similar across various situations. Gradually, the pattern of crying varies in its pitch and intensity to signify different states such as hunger, pain, and sleepiness, etc. These differentiated crying sounds gradually become more meaningful cooing sounds (like ‘aaa’, ‘uuu’, etc.) usually to express happiness.

At around six months of age children enter the babbling stage. Babbling involves prolonged repetition of a variety of consonants and vowel sounds (for example, da—, aa—, ba—). By about nine months of age these sounds get elaborated to strings of some sound combinations, such as ‘dadadadadada’ into repetitive patterns called echolalia. While the early babblings are random or accidental in nature, the later babblings seem to be imitative of adult voices. Children show some understanding of a few words by the time they are six months old. Around the first birthday (the exact age varies from child to child) most children enter the one-word-stage. Their first word usually contains one syllable – ma or da, for instance.

Gradually they move to one or more words which are combined to form whole sentences or phrases. So they are called holophrases. When they are 18 to 20 months of age, children enter a two-word stage and begin to use two words together. The two-word stage exemplifies telegraphic speech. Like telegrams (got admission, send money) it contains mostly nouns and verbs.

Close to their third birthday, i.e. beyond two-and-ahalf years, children’s language development gets focused on rules of the language they hear.

Comparisons of different languages can lead one to pay attention to 'universals'—the ways in which all languages are similar, and to

'particulars' —the ways in which each individual language, or type of language, is special, even unique. Linguists and other social scientists interested in universals have formulated theories to describe and explain human language and human language behavior in general terms as species-specific capacities of human beings. However, the idea that different languages may influence thinking in different ways has been present in many cultures and has given rise to many philosophical treatises.

Because it is so difficult to pin down effects of a particular language on a particular thought pattern, this issue remains unresolved. It comes in and out of fashion and often evokes considerable energy in efforts to support or refute it.

Language Use

As we have discussed earlier, language use involves knowing socially appropriate ways of communication. Knowledge of vocabulary and syntax of a language does not ensure proper use of language to achieve the purpose of communication in a variety of social situations. When we use language we have various pragmatic intentions such as requesting, asking,

thanking, demanding, etc. In order to effectively serve these social goals, language use must be pragmatically correct or contextually appropriate besides being grammatical and meaningful. Children often have difficulty with choice of appropriate utterances for politeness or for requests and their use of language conveys a demand or a command instead of a polite request. When children are engaged in conversations, they also have difficulty in taking turns in speaking and listening like adults.

Relativity and Determinism

There are two problems to confront in this arena: linguistic relativity and linguistic determinism. Relativity is easy to demonstrate. In order to speak any language, you have to pay attention to the meanings that are grammatically marked in that language. For example, in English it is necessary to mark the verb to indicate the time of occurrence of an event you are speaking about: It's raining; It rained; and so forth. In Turkish, however, it is impossible to simply say, 'It rained last night'.

This language, like many American Indian languages, has more than one past tense, depending on one's source of knowledge of the event. In Turkish, there are two past tenses—one to report direct experience and the other to report events that you know about only by inference or hearsay.

Thus, if you were out in the rain last night, you will say, 'It rained last night' using the past-tense form that indicates that you were a witness to the rain; but if you wake up in the morning and see the wet street and garden, you are obliged to use the other past-tense form—the one that indicates that you were not a witness to the rain itself.

Differences of this sort have fascinated linguists and anthropologists for centuries. They have reported hundreds of facts about 'exotic' languages, such as verbs that are marked or chosen according to the shape of an object that is being handled (Navajo) or for the relative ages of speaker and hearer (Korean). Such facts are grist for the mill of linguistic relativity.

And, indeed, they can be found quite readily in 'nonexotic' languages as well. To cite a fact about English that is well known to linguists: It is not appropriate to say Richard Nixon has worked in Washington, but it is perfectly OK to say Gerald Ford has worked in

Washington. Why? English restricts the present perfect tense ('has worked') to assertions about people who are alive. Exotic!

Proponents of linguistic determinism argue that such differences between languages influence the ways people think—perhaps the ways in which whole cultures are organized.

Among the strongest statements of this position are those by Benjamin Lee Whorf and his teacher, Edward Sapir, in the first half of this century—hence the label, 'The Sapir-Whorf Hypothesis', for the theory of linguistic relativity and determinism. Whorf proposed: 'We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way—an agreement that holds throughout our speech community and is codified in the patterns of our language' (Whorf, 1940; in Carroll, 1956, pp. 213-4).

And, in the words of Sapir: 'Human beings...are very much at the mercy of the particular language which has become the medium of expression for their society. ...The fact of the matter is that the "real world" is to a large extent unconsciously built up on the language habits of the group' (Sapir, 1929; in Manlbaum, 1958, p. 162).

Investigating Language and Thought

How can such bold claims be substantiated beyond examination of individual languages themselves? If one takes the hypothesis seriously, it should be possible to show that Turks are more sensitive to evidence than are Americans, but that Americans are more aware of death than Turks. Clearly, the hypothesis cannot be supported on so grand a level. Rather, experimental psychologists and cognitive anthropologists have sought to find small differences, on controlled tasks, between speakers of various languages. Maybe

Navajos are somewhat more sensitive to shapes of objects, for example.

The results have been mixed. In most cases, human thought and action are overdetermined by an array of causes, so the structure of language may not play a central causal role.

Linguistic determinism can best be demonstrated in situations in which language is the principal means of drawing people's attention to a particular aspect of experience. For example, if you regularly speak a language in which you must pick a form of second-person address (you) that marks your social relationship to your interlocutor—such as Spanish tu ('you' for friends and family and for those socially subordinate) vs. usted ('you' for those socially above in status or for those with whom you have no close connection) or French tu versus vous—you must categorize every person you talk to in terms of the relevant social dimensions. (As a thought experiment of linguistic determinism, think of the categorizations of social relationships that would have to be made if Spanish became the common language of the United States.)

What is Problem solving: Type, Strategies, and Obstacles Decision-making: Types and models?

PROBLEM SOLVING

How do we proceed while repairing a broken cycle, or planning a summer tour or patching up a broken friendship? In some cases the solution is reached quickly as in repair of a bicycle based on immediately available cues whereas others are more complex and require time and effort. Problem solving is thinking that is goal-directed. Almost all our day-today activities are directed towards a goal. Here it is important to know that problems are not always in the form of obstacles or hurdles that one faces.

It could be any simple activity that you perform to reach a defined goal, for example, preparing a quick snack for your friend who has just arrived at your place. In problem solving there is an initial state (i.e. the problem) and there is an end state (the goal). These two anchors are connected by means of several steps or mental operations.

would clarify your understanding of various steps through which one solves a problem. You can try out the problems given in Activity 8.3 with your friends and observe how they are approaching the problem. You can ask them the steps they follow while solving these problems

From organizing your movie collection to deciding to buy a house, problem-solving makes up a large part of daily life. Problems can range from small (solving a single math equation on your homework assignment) to very large (planning your future career).

In cognitive psychology, the term problem-solving refers to the mental process that people go through to discover, analyze, and solve problems.[1] This involves all of the steps in the problem process, including the discovery of the problem, the decision to tackle the issue, understanding the problem, researching the available options and taking actions to achieve your goals. Before

problem-solving can occur, it is important to first understand the exact nature of the problem itself. If your understanding of the issue is faulty, your attempts to resolve it will also be incorrect or flawed.

Mental Processes at Work During Problem-Solving

There are a number of mental processes at work during problem-solving. These include:

- Perceptually recognizing a problem
- Representing the problem in memory
- Considering relevant information that applies to the current problem
- Identify different aspects of the problem
- Labeling and describing the problem

Problem-Solving Strategies

- **Algorithms:** An algorithm is a step-by-step procedure that will always produce a correct solution. A mathematical formula is a good example of a problem-solving algorithm. While an algorithm guarantees an accurate answer, it is not always the best approach to problem-solving. This strategy is not practical for many situations because it can be so time-consuming. For example, if you were trying to figure out all of the possible number combinations to a lock using an algorithm, it would take a very long time!
- **Heuristics:** A heuristic is a mental rule-of-thumb strategy that may or may not work in certain situations. Unlike algorithms, heuristics do not always guarantee a correct solution. However, using this problem-solving strategy does allow

people to simplify complex problems and reduce the total number of possible solutions to a more manageable set.[2]

- **Trial and Error:** A trial-and-error approach to problem-solving involves trying a number of different solutions and ruling out those that do not work. This approach can be a good option if you have a very limited number of options available. If there are many different choices, you are better off narrowing down the possible options using another problem-solving technique before attempting trial-and-error.
- **Insight:** In some cases, the solution to a problem can appear as a sudden insight. According to researchers, insight can occur because you realize that the problem is actually similar to something that you have dealt with in the past, but in most cases, the underlying mental processes that lead to insight happen outside of awareness.

Obstacles in Problem-Solving

Of course, problem-solving is not a flawless process. There are a number of different obstacles that can interfere with our ability to solve a problem quickly and efficiently. Researchers have described a number of these mental obstacles, which include functional fixedness, irrelevant information, and assumptions.

- **Functional Fixedness:** This term refers to the tendency to view problems only in their customary manner.[3]

Functional fixedness prevents people from fully seeing all of the different options that might be available to find a solution.

- **Irrelevant or Misleading Information:** When you are trying to solve a problem, it is important to distinguish between information that is relevant to the issue and irrelevant data that

can lead to faulty solutions. When a problem is very complex, the easier it becomes to focus on misleading or irrelevant information.

- **Assumptions:** When dealing with a problem, people often make assumptions about the constraints and obstacles that prevent certain solutions.
- **Mental Set:** Another common problem-solving obstacle is known as a mental set, which is the tendency people have to only use solutions that have worked in the past rather than looking for alternative ideas.[4] A mental set can often work as a heuristic, making it a useful problem-solving tool. However, mental sets can also lead to inflexibility, making it more difficult to find effective solutions.

particular strategy would sometimes help in solving a new problem. However, this tendency also creates a mental rigidity that obstructs the problem solver to think of any new rules or strategies. Thus, while in some situations mental set can enhance the quality and speed of problem solving, in other situations it hinders problem solving. You might have

experienced this while solving mathematical problems. After completing a couple of questions, you form an idea of the steps that are required to solve these questions and subsequently you go on following the same steps, until a point where you fail.

At this point you may experience difficulty in avoiding the already used steps. Those steps would interfere in your thought for new strategies. However, in day-to-day activities we often rely on past experiences with similar or related problems.

Like mental set, functional fixedness in problem solving occurs when people fail to solve a problem because they are fixed on a thing's usual function. If you have ever used a hardbound book to hammer a nail, then you have overcome functional fixedness.

Lack of Motivation

People might be great at solving problems, but all their skills and talents are of no use if they are not motivated. Sometimes people give up easily when they encounter a problem or failure in implementing the first step. Therefore, there is a need to persist in their effort to find a solution

DECISION-MAKING

Inductive and deductive reasonings allow us to make judgments. In judgment we draw conclusions, form opinions, evaluate events, objects, based on knowledge and available evidences. Consider this example, the man is very talkative, likes to mix with people, can convince others with ease — he would be most suitable for a salesperson's job. Our judgment of this person is based on the specific characteristics of an expert salesperson.

Here we will discuss how we make decisions and judgments. Sometimes judgments are automatic and require no conscious effort by the person and occur as a matter of habit, for example,

applying brakes on seeing the red light. However, evaluating a novel or a literary text requires reference to your past knowledge and experience. Judging the beauty of a painting would involve your personal preferences. Thus our judgments are not independent of our beliefs and attitudes. We also make changes in our judgments based on newly acquired information. Consider this example.

A new teacher joins the school, students make onthe-spot judgment of the teacher as being very strict. However, in subsequent classes, they closely interact with the teacher and make changes in their evaluation. Now they judge the teacher to be extremely studentfriendly. Many of the problems you solve each day require you to make decisions. What to wear for the party? What to eat for dinner? What to say to your friend?

The answer to all these lies in picking or choosing one of several choices. In decision-making, we sometimes choose among options based on choices of personal significance. Judgment and decisionmaking are interrelated processes. In decisionmaking the problem before us is to choose among alternatives by evaluating the cost and benefit associated with each alternative.

For example, when you have the option to choose between psychology and economics as subjects in Class XI, your decision would be based upon your interest, future prospects, availability of books, efficiency of teachers, etc. You could evaluate them by talking to seniors and faculty members and attending a few classes, etc. Decision-making differs from other types of problem solving. In decisionmaking we already know the various solutions or choices and one has to be selected. Suppose your friend is a very good player of badminton. S/he is getting an opportunity to play at the state level.

At the same time the final examination is approaching and s/he needs to study hard for it. S/he will have to choose between two options, practising for badminton or studying for the final examination. In this situation her/his decision will be based upon evaluation of all possible outcomes. You would observe that people differ in their priorities and therefore their decisions will differ. In real life situations we take quick decisions and therefore, it is not

possible always to evaluate every situation thoroughly and exhaustively.

The decision-making process though a logical one is a difficult task. All decisions can be categorized into the following three basic models.

(1) The Rational/Classical Model.

(2) The Administrative or Bounded Rationality Model.

(3) The Retrospective Decision-Making Model.

All models are beneficial for understanding the nature of decision-making processes in enterprises or organisations. All models are based on certain assumptions on which the decisions are taken.

1. The Rational/Classical Model:

The rational model is the first attempt to know the decision-making-process. It is considered by some as the classical approach to understand the decision-making process. The classical model gave various steps in decision-making process which have been discussed earlier.

Features of Classical Model:

1**.** Problems are clear.

2. Objectives are clear.

3. People agree on criteria and weights.

4. All alternatives are known.

5. All consequences can be anticipated.

6. Decision makes are rational.

i. They are not biased in recognizing problems.

ii. They are capable of processing ail relevant information

iii. They anticipate present and future consequences of decisions.

iv. They search for all alternatives that maximizes the desired results.

2. Bounded Rationality Model or Administrative Man Model:

Decision-making involve the achievement of a goal. Rationality demands that the decision-maker should properly understand the alternative courses of action for reaching the goals.

He should also have full information and the ability to analyse properly various alternative courses of action in the light of goals sought. There should also be a desire to select the best solutions by selecting the alternative which will satisfy the goal achievement.

Herbert A. Simon defines rationality in terms of objective and intelligent action. It is characterised by behavioural nexus between ends and means. If appropriate means are chosen to reach desired ends the decision is rational.

Bounded Rationality model is based on the concept developed by Herbert Simon. This model does not assume individual rationality in the decision process.

Instead, it assumes that people, while they may seek the best solution, normally settle for much less, because the decisions they confront typically demand greater information, time, processing capabilities than they possess. They settle for “bounded rationality or limited rationality in decisions. This model is based on certain basic concepts.

a. Sequential Attention to alternative solution:

Normally it is the tendency for people to examine possible solution one at a time instead of identifying all possible solutions and stop searching once an acceptable (though not necessarily the best) solution is found.

b. Heuristic:

These are the assumptions that guide the search for alternatives into areas that have a high probability for yielding success.

c. Satisficing:

Herbert Simon called this “satisficing” that is picking a course of action that is satisfactory or “good enough” under the circumstances. It is the tendency for decision makers to accept the first alternative that meets their minimally acceptable requirements rather than pushing them further for an alternative that produces the best results.

Satisficing is preferred for decisions of small significance when time is the major constraint or where most of the alternatives are essentially similar.

Thus, while the rational or classic model indicates how decisions should be made (i.e. it works as a prescriptive model), it falls somewhat short concerning how decisions are actually made (i.e. as a descriptive model).

3. Retrospective decision model (implicit favourite model):

This decision-making model focuses on how decision-makers attempt to rationalise their choices after they have been made and try to justify their decisions. This model has been developed by Per Soelberg. He made an observation regarding the job choice

processes of graduating business students and noted that, in many cases, the students identified implicit favorites (i.e. the alternative they wanted) very early in the recruiting and choice process. However, students continued their search for additional alternatives and quickly selected the best alternative.

The total process is designed to justify, through the guise of scientific rigor, a decision that has already been made intuitively. By this means, the individual becomes convinced that he or she is acting rationally and taking a logical, reasoned decision on an important topic.

Some Common Errors in Decision-Making:

Since the importance of the right decision cannot be overestimated enough for the quality of the decisions can make the difference between success and failure. Therefore, it is imperative that all factors affecting the decision be properly looked into and fully investigated.

In addition to technical and operational factors which can be quantified and analyzed, other factors such as personal values, personality traits, psychological assessment, perception of the environment, intuitional and judgemental capabilities and emotional interference must also be understood and credited.

Some researchers have pinpointed certain areas where managerial thinking needs to be re-assessed and where some common mistakes are made. These affect the decision-making process as well as the efficiency of the decision, and must be avoided.

Some of the errors re:

a. Indecisiveness:

Decision-making is full of responsibility. The fear of its outcome can make some people timid about taking a decision. This timidity may result in taking a long time for making a decision and the opportunity may be lost. This trait is a personality trait and must be looked into seriously. The managers must be very quick in deciding.

b. Postponing the decision until the last moment:

This is a common feature which results in decision-making under pressure of time which generally eliminates the possibility of thorough analysis of the problem which is time consuming as well as the establishment and comparison of all alternatives. Many students, who postpone studying until near their final exams, usually do not do well in the exams.

Even though some managers work better under pressures, most often an adequate time period is required to look objectively at the problem and make an intelligent decision. Accordingly, a decision plan must be formulated; time limits must be set for information gathering, analysis and selection of a course of action.

c. A failure to isolate the root cause of the problem:

It is a common practice to cure the symptoms rather than the causes. For example, a headache may be on account of some deep-rooted emotional problem. A medicine for the headache would not cure the problem. It is necessary to separate the symptoms and their causes.

d. A failure to assess the reliability of informational sources:

Very often, we take it for granted that the other person's opinion is very reliable and trustworthy and we do not check for the accuracy of the information ourselves.

Many a time, the opinion of the other person is taken, so that if the decision fails to bring the desired results, the blame for the failure can be shifted to the person who had provided the information. However, this is a poor reflection on the manager's ability and integrity and the manager must be held responsible for the outcome of the decision.

e. The method for analysing the information may not be the sound one:

Since most decisions and especially the non-programmed ones have to be based upon a lot of information and factors, the procedure to identify, isolate and select the useful information must be sound and dependable. Usually, it is not operationally feasible to objectively analyse more than five or six pieces of information at a time.

Hence, a model must be built which incorporates and handles many variables in order to aid the decision makers. Also, it will be desirable to define the objectives, criteria and constraints as early in the decision-making process as possible.

This would assist in making the process more formal so that no conditions or alternatives would be overlooked. Following established procedures would eliminate the efforts of emotions which may cloud the process and rationality.

f. Do implement the decision and follow through:

Making a decision is not the end of the process, rather it is a beginning. Implementation of the decision and the results obtained are the true barometer of the quality of the decision. Duties must be assigned, deadlines must be set, evaluation process must be established and contingency plans must be prepared in advance.

The decisions must be implemented whole heartedly to get the best results.

What is Metacognition: Metacognitive knowledge and Metacognitive regulation?

Metacognition: Metacognitive knowledge and Metacognitive regulation

Metacognitive knowledge

Metacognitive strategies refers to methods used to help students understand the way they learn; in other words, it means processes designed for students to 'think' about their 'thinking'.

Teachers who use metacognitive strategies can positively impact students who have learning disabilities by helping them to develop an appropriate plan for learning information, which can be memorized and eventually routine. As students become aware of how they learn, they will use these processes to efficiently acquire new information, and consequently, become more of an independent thinker. Below are three metacognitive strategies, which all include related resources, that can be implemented in the classroom:

Think Aloud

Great for reading comprehension and problem solving. Think-alouds help students to consciously monitor and reflect upon what they are learning. This strategy works well when teachers read a story or problem out loud and periodically stop to verbalize their thoughts. This allows students to follow the teacher's thinking process, which gives them the foundation they need for creating their own strategies and processes that can be useful for understanding what they are trying to comprehend.

Checklist, Rubrics and Organizers

Great for solving word problems. These organizational tools support students in the decision-making process because they serve as an aid for planning and self-evaluation. Typically they ask what students know and need to know to arrive at an answer, and emphasize the need to reread the problem and self-check responses.

Explicit Teacher Modeling

Great for math instruction. Explicit teacher modeling helps students understand what is expected of them through a clear example/model of a skill or concept. When a teacher provides a easy to follow procedure for solving a problem, students have a memorable strategy to use for approaching a problem on their own.

Reading Comprehension

Truly comprehending reading involves students actively engaging with a text and accurately deciphering the layers of meaning. It is very important for students to develop solid reading comprehension skills because statistics show that people who have low reading comprehension ability suffer in academic, professional, and

personal pursuits. The resources in this guide from supersummary.com are effective strategies for promoting reading comprehension.

Metacognition and Learning

Metacognition denotes in-depth thinking in which cognitive processes involved in learning are actively controlled. This includes planning how to accomplish a given learning task, monitoring understanding, and estimating progress toward the completion of a task.

It is believed that students have greater ability to control goals, dispositions, and attention when they are more aware of their thinking processes as they learn. This means that self-regulation is a result of self-awareness.

For instance, when a student is aware of his lack of commitment to write his thesis, and bears the knowledge that he is procrastinating, delaying, and allowing himself to be distracted by other less important things, then he could take action to get started on doing the task. This is possible only if the student becomes aware of his procrastination and takes control in planning on how to approach his thesis completion.

Components of Metacognition

Metacognition is divided into three components:

- Metacognitive knowledge
- Metacognitive regulation
- Metacognitive experiences

Metacognitive knowledge refers to the awareness individuals possess about themselves and other people as cognitive processors.

Metacognitive regulation, on the other hand, has to do with people's control over cognition and learning experiences through a set of methods that help people regulate their learning.

Metacognitive experiences involve cognitive efforts that are currently taking place.

Types of Metacognitive Knowledge

The metacognitive knowledge component of metacognition is divided into three different types of knowledge:

- Declarative knowledge
- Procedural knowledge
- Conditional knowledge

Declarative knowledge refers to the factual information that we know, and can both be spoken or written. This is also the knowledge about ourselves as learners and about what factors can influence our performances.

Procedural knowledge refers to information on how to do something or how to perform the procedural steps that make up a task. A high degree of procedural knowledge allows us to perform tasks more automatically through a variety of strategies.

Conditional knowledge refers to the knowledge about when to use a procedure, skill, or strategy or when not to. Such knowledge allows us to assign optimal resources for various tasks.

Skills in Metacognitive Regulation

There are three important skills in metacognitive regulation:

- Planning
- Monitoring
- Evaluating

Planning involves suitable selection of strategies and the right assignment of resources. Monitoring includes awareness of understanding and task performance, while evaluating refers to the assessment of the final result of a task and the efficiency carried out during task performance.

Metacognitive Strategies

Research has shown that teaching students metacognitive strategies can improve learning. Among the different learning strategies that are commonly used when studying or doing homework are rote memorization, goal setting, monitoring, self-assessing, and regulating during thinking and writing processes.

Metacognitive experiences and problem solving

Research revealed the two components of metacognition – metacognitive knowledge and metacognitive experiences – impact individuals' problem solving differently. Flavell (1979) described metacognitive experiences as "any conscious cognitive or affective experience that accompany or pertain to any intellectual enterprise" (p. 906). He believed they were more likely to occur during a task due to the importance of individuals' decisions and actions in the endeavor. Efklides (2001) maintained that metacognitive experiences monitored task characteristics and also reflected an individual's goals in task-making.

She identified different categories of metacognitive experiences, and some of these included: feeling of familiarity, feeling of confidence, feeling of difficulty, feeling of satisfaction, estimate of solution correctness, and estimate of effort expenditure. She found individuals' metacognitive experiences were influenced by cognitive ability as well as "personality and other affective factors" .

Moreover, the author joined Flavell (1979) in linking metacognitive experiences to triggering metacognitive knowledge. Efklides maintained that metacognitive experiences "monitor online cognitive processing" from the individual's perspective, and "online task-specific knowledge" as well as for influencing "control decisions" .

Her research revealed that metacognitive experiences varied according to the level of "task difficulty" and "phase of cognitive processing (advance, planning, and solution production)" .

Akama and Yamauchi's (2004) study underscored the role of metacognitive experiences in problem solving. The authors examined the effect of task performance on individuals' metacognitive experiences. Comparisons of participants' metacognitive experiences questionnaire results before and after the task illustrated differences between those who successfully solved the puzzle and those who did not.

The success group "reported significantly higher feeling of satisfaction" confidence, knowledge, and correctness of the solution than the failure group. The authors found participants' prior performance affected "Feeling of difficulty, Need to think of the Success group and Feeling of having knowledge after the task for both groups.

The study also showed high correlations between individuals' task performance and metacognitive experiences after the task, which

the authors attributed to participants' performance. The article maintained that this result supported earlier studies that illustrated "participants can get information from their performance and revise metacognitive experiences after problem-solving"

Metacognitive regulation

Metacognitive Experiences involve the use of Metacognitive Strategies or Metacognitive Regulation (Brown, 1987). Metacognitive strategies are sequential processes that one uses to control cognitive activities, and to ensure that a cognitive goal (eg:- understanding a text) has been met.

These processes help to regulate and oversee learning, and consist of planning and monitoring cognitive activities, as well as checking the outcomes of those activities. Thus metacognitive regulation is the regulation of cognition and learning experiences through a set of activities that help people control their learning. For example, after reading a paragraph in a text, a learner may question herself about the concepts discussed in the paragraph.

Her cognitive goal is to understand the text. Self questioning is a common Metacognitive Comprehension Monitoring Strategy. If she finds that she cannot answer her own questions, or that she does not understand the material discussed, she must then determine what needs to be done to ensure that she meets the cognitive goal of understanding the text.

She may decide to go back and reread the paragraph with the goal of being able to answer

the questions she had generated if, after rereading through the text she can now answer the questions, she may determine that she

understands the material. Thus, the Metacognitive Strategy of self questioning is used to ensure that the cognitive goal of comprehension is met.

Metacognitive experiences are those experiences that have something to do with the current, ongoing cognitive endeavour. Metacognitive experiences usually precede or follow a cognitive activity. They often occur when cognitions fail, such as the recognition that one did not understand what one just read. Such an impasse is believed to activate metacognitive processes as the learner attempts to rectify the situation.

Metacognition, or the ability to control one's cognitive processes (self regulation) has been linked to intelligence (Borokowski et al., 1987, Brown, 1987, Sternberg, 1984, 1986). Sternberg refers to these executive processes as "Metacomponents in his triarchic theory of control, other cognitive components as well as receive feed back from these components.

According to Sternberg, Metacomponents are responsible for "figuring out how to do a particular task or set of tasks, and then making sure that the task or set of tasks are done correctly" (Sternberg, 1986). These executive processes involve planning, evaluating, monitoring and problem solving activities. Sternberg maintains that the ability to appropriately allocate cognitive resources, such as deciding how and when a given task should be accomplished is central to intelligence.

What is Intelligence: Spearman; Thurstone; Jensen; Cattell; Gardner; Stenberg; Goleman; Das, Kar & Parrila?

Intelligence: Spearman; Thurstone; Jensen; Cattell; Gardner; Stenberg; Goleman; Das, Kar & Parrila

General intelligence, also known as g factor, refers to the existence of a broad mental capacity that influences performance on cognitive ability measures. Charles Spearman first described the existence of general intelligence in 1904. According to Spearman, this g factor was responsible for overall performance on mental ability tests.

Spearman noted that while people certainly could and often did excel in certain areas, people who did well in one area tended also to do well in other areas. For example, a person who does well on a verbal test would probably also do well on other tests.

Those who hold this view believe that intelligence can be measured and expressed by a single number, such as an IQ score. The idea is that this underlying general intelligence influences performance on all cognitive tasks.

General intelligence can be compared to athleticism. A person might be a very skilled runner, but this does not necessarily mean that they will also be an excellent figure skater. However, because this person is athletic and fit, they will probably perform much better on other physical tasks than an individual who is less coordinated and more sedentary.

Spearman and General Intelligence

Charles Spearman was one of the researchers who helped develop a statistical technique known as factor analysis. Factor analysis allows researchers to use a number of different test items to measure common abilities. For example, researchers might find that people who score well on questions that measure vocabulary also perform better on questions related to reading comprehension.

Spearman believed that general intelligence represented an intelligence factor underlying specific mental abilities. All tasks on intelligence tests, whether they related to verbal or mathematical abilities, were influenced by this underlying g-factor.

Many modern intelligence tests, including the Stanford-Binet, measure some of the cognitive factors that are thought to make up general intelligence.

- **Visual-spatial processing**: Abilities such as putting together puzzles and copying complex shapes
- **Quantitative reasoning**: The capacity to solve problems that involve numbers
- **Knowledge**: A person's understanding of a wide range of topics
- **Fluid reasoning**: The ability to think flexibly and solve problems
- **Working memory**: The use of short-term memory (such as being able to repeat a list of items)

Challenges to the Concept of General Intelligence

The notion that intelligence could be measured and summarized by a single number on an IQ test was controversial during Spearman's time and has remained so over the decades since. Some psychologists, including L.L. Thurstone, challenged the concept of a g-factor. Thurstone instead identified a number of what he referred to as "primary mental abilities."

More recently, psychologists such as Howard Gardner have argued against the notion that a single general intelligence can accurately capture all of human mental ability. Gardner instead proposed that multiple intelligences exist. Each intelligence represents abilities in a certain domain, such as visual-spatial intelligence, verbal-linguistic intelligence, and logical-mathematical intelligence.

Research today points to an underlying mental ability that contributes to performance on many cognitive tasks. IQ scores, which are designed to measure this general intelligence, are also thought to influence an individual's overall success in life. However, while IQ can play a role in academic and life success, other factors such as childhood experiences, educational experiences, socioeconomic status, motivation, maturity, and personality also play a critical role in determining overall success.

The early 1900s saw Charles Spearman using a mathematical approach to the question of measuring human intelligence. Using statistical factor analysis Spearman identified g, a single underlying intelligence factor he believed accounted for the variety of observable abilities.

Spearman noticed that children’s grades across all school subjects tended to be highly correlated. If a child did well in one subject, they generally also did well in another subject, and vice versa. What did this say about the nature of intelligence?

He devised factor analysis to measure the relationships between seemingly varied cognitive abilities and account for the correlations he saw between scores on different tests.

The result was Spearman's two-factor theory which attempted to show that all cognitive performance can be explained by two variables: one general ability (g) and the many specific abilities (s) it gave rise to. Later, however, further analysis showed that g alone was enough to explain the correlations between different tests. When people talk about IQ or intelligence, it's usually this general mental ability that they are referring to.

Alternatives and Criticisms

The existence of a single quantifiable factor for human intelligence has been hotly debated ever since Spearman proposed it.

Criticism came from one of Spearman's own students, Raymond Cattell, who thought that intelligence could be understood as two main capacities: "fluid" (Gf) and "crystallized" (Gc).

Cattell thought that crystallized intelligence was a kind of cemented knowledge bank acquired over time, representing all those abilities that were already familiar from previous learning. On the other hand, fluid intelligence was the ability to acquire that knowledge in the first place, i.e. to learn in the moment. He saw g as more accurately Gc, and that tests focusing only on g would omit an important developmental factor in human intelligence.

Others were similarly critical for the reductive nature of g, including psychologist L.L. Thurstone and J. P Guilford. Both believed that there were several, irreducible and independent domains of intelligence, however many have since found correlations between their tests which strongly suggest a general factor.

Still more criticism came from Howard Gardener who proposed nine domains of intelligence, including some decidedly non-cognitive ones like musical, existential and bodily-kinesthetic intelligence. Almost everyone can think of a person who performed poorly at school but excelled in sport or dance, perhaps, or a person with musical genius that didn't translate to any other area in their life.

Gardner argued that the academic environment over-emphasized verbal and logical skill while ignoring these other forms of intelligence. However, his critics have responded that we think of something like athletic skill as just that – a skill and not strictly intelligence.

Thurstone's theory :

Primary mental abilities/Group factor theory: States that Intelligent Activities are not an expression of innumerable highly specific factors, as Thorndike claimed. Nor is it the expression primarily of a general factor that pervades all mental activities. It is the essence of intelligence, as Spearman held.

Instead, the analysis of interpretation of Spearman and others led them to the conclusion that 'certain' mental operations have in common a 'primary' factor that gives them psychological and functional unity and that differentiates them from other mental operations. These mental operations then constitute a group.

A second group of mental operation has its own unifying primary factor, and so on. In other words, there are a number of groups of mental abilities, each of which has its own primary factor, giving the group a functional unity and cohesiveness. Each of these primary factors is said to be relatively independent of the others.

Thurstone has given the following six primary factors :

(i) The Number Factor

(N)—Ability to do Numerical Calculations rapidly and accurately.

(ii) The Verbal Factor

(V)—Found in tests involving Verbal Comprehension.

(iii) The Space Factor

(S)—Involved in any task in which the subject manipulates the imaginary object in space.

(iv) Memory

(M)—Involving ability to memorize quickly.

(v) he Word Fluency Factor

(W)—Involved whenever the subject is asked to think of isolated words at a rapid rate.

(vi) The Reasoning Factor

(R)—Found in tasks that require a subject to discover a rule or principle involved in a series or groups of letters. Based on these factors Thurstone constructed a new test of intelligence known as ‘‘Test of Primary Mental Abilities (PMA).’’

JENSEN'S THEORY OF INTELLIGENCE

The criticism of my "theory of intelligence" by Humphreys and Dachler (1969), although making an interesting and worthwhile methodological point, is based on so limited a view of the theory and of the supporting evidence as to constitute a very weak criticism when viewed in proper perspective.

The questionable suitability of the Project TALENT tests used by Humphreys and Dachler for testing hypotheses derived from the theory, as compared with tests and studies specifically designed for this purpose, hardly warrants these authors' overly sweeping conclusion that "... Jensen's published results can be disregarded and that unbiased data lend no support to his theory [p. 426]." Theoretical Misconceptions

The theory, which has been explicated in detail elsewhere (Jensen, 1968a, 1969, in press), concerns the organization of mental abilities in individuals. It incidently predicts, and was originally formulated to explain, relationships between intelligence, rote-learning ability, and sooioeconomic status (SES).

It postulates two broad types of mental ability: Level I (associative and rote learning ability as measured, for example, by digit-span memory and rote serial learning), and Level II (abstract reasoning as measured by most IQ tests and in purer form by tests such as Raven's Progressive Matrices).

The correlation between Level I and Level II abilities, according to the theory, is due largely to the hierarchical functional dependence of Level II proo1 Requests for reprints should be sent to:' Arthur R. Jensen, School of Education, University of California, Berkeley, California 94720. esses upon Level I.

The educational and occupational requirements of our society tend to sort out people much more by their Level II ability than by their Level I ability, so that lower and upper SES groups will differ markedly on Level II tests while differing little or not at all on Level I. Humphreys and Dachler are wrong to argue that a general theory of intelligence means that it must generalize to the entire population. The theory is about the organization of mental abilities.

It makes no statements about population parameters per se. Given such parameters, however,

the theory should yield specific predictions. But populations differ in their social class composition and relative frequencies in various SES categories, and a truly general theory of intelligence cannot include these specific population characteristics (though it needs to know them for specific predictions) any more than a general theory of gravitation includes such data as the mass of the earth or air resistance,

which nevertheless need to be taken into account in order to make a specific prediction from the law of falling bodies. Humphreys and Dachler have thus failed to distinguish clearly between the theory itself and the ancillary information required to derive any specific test of the theory. Furthermore,

it is not at all clear just what alternative theory or empirical state of affairs prevails according to Humphreys and Dachler. Is it that all kinds of mental abilities are about equally correlated with SES? This is clearly refuted by much solid evidence.

Cattell Theory of intelligence

The fluid aspect of this theory says that intelligence is a basic capacity due to genetic potentiality. While this is affected by the past and new expriences, the crystallized theory is a capacity resultant of experiences, learning and environment.

In the 1930s and early 1940s, both Raymond B. Cattell and Donald O. Hebb were critical of the ability of the currently available tests to accurately measure intelligence and both began to develop improved tests of intelligence. Cattell was in search of a “culture-

free" test of intelligence while Hebb was concerned with the development of tests of intelligence which could measure the effects of localized brain damage at different ages in patients with little schooling.

At that time, intelligence testing was fuelled by a scientific interest to quantify the intelligence of different groups of people, with a focus on special classes of individuals, such as the insane, feebleminded, deaf, and delinquent. The intelligence scales used were influenced by the work of Alfred Binet and Theodore Simon with the publication of the first Binet-Simon scale in 1905 (Binet and Simon, 1905). This "measuring scale of intelligence" was originally developed for use with school children in Paris and consisted of a series of 30 brief cognitive tests.

The Binet-Simon intelligence scale and its modifications (such as the Stanford-Binet scale) were the most commonly used tests of intelligence in the 1930's (Pintner, 1931), but the Wechsler-Bellevue intelligence scale, published in 1939 (Wechsler, 1939) introduced a number of innovations in intelligence testing including a test more suitable for measuring intelligence in adults rather than children; the inclusion of both verbal and performance measures of intelligence; and the omission of memory tests (Boake, 2002).

Cattell's work on intelligence testing

Cattell (1940a) gave a detailed critique of the Binet test and was concerned that differences in scores on intelligence tests were due to differences in social status, special abilities distinct from intelligence, or other environmental factors. The problem that he identified was that tests of intelligence focused on acquired skills and verbal ability rather than on intelligence per se. Cattell was interested in developing "culture free" intelligence tests based on

non-verbal skills that would define a person's general intelligence "g" (Spearman, 1904) irrespective of their social status, race, verbal ability or environmental experience. Cattell thus developed a culture-free test with seven sub-tests. The tests were designed to be non-verbal and instructions were given using a series of worked examples rather than verbal instructions.

Cattell et al. (1941) outlined seven variables which influenced intelligence or "general ability" and then analyzed the effects of environmental variables such as cultural knowledge and training (practice) on each test. He then compared the scores of American-born and immigrant children on his culture-free test and three other tests of intelligence: the Terman-Merrill Revision of the Binet Test, the arithmetic section of the American Council of Education (A.C.E.) Test, and the Arthur Performance Test. Based on these studies, Cattell et al. (1941) found that the Arthur test was the most culture-free, the culture-free test was second, the Terman-Merrill-Binet test was third and the A.C.E. test fourth, and concluded that culture-free tests should be administered using people from a wide range of cultures, "primitive and otherwise."

Gardner **Theory of intelligence**

GARDENER'S THEORY OF MULTIPLE INTELLIGENCE :

Howard Gardner in his book ''Frames of Mind, The Theory of Multiple Intelligence'' (1983), puts forth a new and different view of human intellctual competencies. He argues boldly and cogently that we are all born with potential to develop a multiplicity of Intelligence,

most of which have been overlooked in our testing society, and all of which can be drawn upon to make us competent individuals.

The potential for musical accomplishments, bodily mastery and spatial reasoning, and the capacities to understand ourselves as well as others are, Gardner argues, ‘‘the multiple forms of intelligence that we must add to the conventional—and typical tested—logical and lingustic skills long called I.Q.’’.

The multiple intelligence theory is that people possess eight types of intelligence : linguistic, logical, spatial, musical, motor ability, interpersonal, intrapersonal and naturalistic intelligence.

Sternberg’s triarchic theory: Psychologist Robert Sternberg (1985) has constructed a three—pronged, or triarchic theory of intelligence. The Three types are :

Analytical Intelligence—is what we generally think of as academic ability. It enables us to solve problems and to acquire new knowledge. Problem—solving skill include encoding information, combining and comparing pieces of information and generating a solution.

Creative Intelligence—is defined by the abilities to cope with novel situations and to profit from experience. The ability to quickly relate novel situations to familiar situations (that is, to perceive similarities and differences) fosters adaptation.

Moreover, as a result of experience, we also become able to solve problems more rapidly. Practical Intelligence—or ‘‘street smarts’’, enable people to adapt to the demands of their environment.

For example, keeping a job by adapting one’s behavior to the employer’s requirements is adaptive. But if the employer is making unreasonable demands, reshaping the environment (by changing

the employer's attitudes) or selecting an alternate enviornment (by finding a more suitable job) is also adaptive.

Stenberg Theory of intelligence

The triarchic theory of intelligence consists of three subtheories:

(i) the componential subtheory which outlines the structures and mechanisms that underlie intelligent behavior categorized as metacognitive, performance, or knowlege acquistion components , (ii) the experiential subtheory that proposes intelligent behavior be interpreted along a continuum of experience from novel to highly familar tasks/situations,

(iii) the contextual subtheory which specifies that intelligent behavior is defined by the sociocultural context in which it takes place and involves adaptation to the environment, selection of better environments, and shaping of the present environment.

According to Sternberg, a complete explanation of intelligence entails the interaction of these three subtheories. The componential subtheory specifies the potential set of mental processes that underlies behavior (i.e., how the behavior is generated) while the contextual subtheory relates intelligence to the external world in terms of what behaviors are intelligent and where. The experiential subtheory addresses the relationship between the behavior in a given task/situation and the amount of experience of the individual in that task/situation. The componential subtheory is the most developed aspect of the triarchic theory and is based upon Sternberg (1977) which presents an information processing perspective for abilities. One of the most fundamental components according to Sternberg's research are the metacognition or

"executive" processes that control the strategies and tactics used in intelligent behavior.

Application

The triarchic theory is a general theory of human intelligence. Much of Sternberg's early research focused on analogies and syllogistic reasoning. Sternberg has used the theory to explain exceptional intelligence (gifted and retardation) in children and also to critique existing intelligence tests. Sternberg (1983) outlines the implications of the theory for skill training. Later work examines topics such as learning styles (Sternberg, 1997) and creativity (Sternberg, 1999).

Example

Sternberg (1985) describes the results of various analogy experiments that support the triarchic theory. For example, in a study that involved adults and children solving simple analogies, he found that the youngest children solved the problems differently and theorized that this was because they had not yet developed the ability to discern higher order relations. In another study of analogies with children at a Jewish school, he discovered a systematic bias towards selection of the first two answers on the right and suggested that this could be accounted for by the right-to-left reading pattern of Hebrew.

Principles

1. Training of intellectual performance must be socioculturally relevant to the individual
2. A training program should provide links between the training and real-world behavior.

3. A training program should provide explicit instruction in strategies for coping with novel tasks/situations
4. A training program should provide expilicit instruction in both executive and non-executive information processing and interactions between the two.
5. Training programs should actively encourage individuals to manifest their differences in strategies and styles.

Origins

Sternberg proposed his theory in 1985 as an alternative to the idea of the general intelligence factor. The general intelligence factor, also known as g, is what intelligence tests typically measure. It refers only to “academic intelligence.”

Sternberg argued that practical intelligence—a person’s ability to react and adapt to the world around them—as well as creativity are equally important when measuring an individual's overall intelligence. He also argued that intelligence isn’t fixed, but rather comprises a set of abilities that can be developed. Sternberg's assertions led to the creation of his theory.

Subtheories

Sternberg broke his theory down into the following three subtheories:

Contextual subtheory: The contextual subtheory says that intelligence is intertwined with the individual’s environment. Thus, intelligence is based on the way one functions in their everyday circumstances, including one’s ability to a) adapt to one’s environment, b) select the best environment for oneself, or c) shape the environment to better fit one’s needs and desires.

Experiential subtheory: The experiential subtheory proposes that there is a continuum of experience from novel to automation to which intelligence can be applied. It's at the extremes of this continuum that intelligence is best demonstrated. At the novel end of the spectrum, an individual is confronted with an unfamiliar task or situation and must come up with a way to deal with it. At the automation end of the spectrum, one has become familiar with a given task or situation and can now handle it with minimal thought.

Componential subtheory: The componential theory outlines the various mechanisms that result in intelligence. According to Sternberg, this subtheory is comprised of three kinds of mental processes or components:

- **Metacomponents** enable us to monitor, control, and evaluate our mental processing, so that we can make decisions, solve problems, and create plans.
- **Performance components** are what enable us to take action on the plans and decisions arrived at by the metacomponents.
- **Knowledge-acquisition components** enable us to learn new information that will help us carry out our plans.

Kinds of Intelligence

Each subtheory reflects a particular kind of intelligence or ability:

- **Practical intelligence:** Sternberg called one's ability to successfully interact with the everyday world practical intelligence. Practical intelligence is related to the contextual subtheory. Practically intelligent people are especially adept at behaving in successful ways in their external environment.

- **Creative intelligence:** The experiential subtheory is related to creative intelligence, which is one's ability to use existing knowledge to create new ways to handle new problems or cope in new situations.
- **Analytical intelligence:** The componential subtheory is related to analytical intelligence, which is essentially academic intelligence. Analytical intelligence is used to solve problems and is the kind of intelligence that is measured by a standard IQ test

Sternberg observed that all three kinds of intelligence are necessary for successful intelligence, which refers to the ability to be successful in life based on one's abilities, personal desires, and environment.

Daniel Goleman's Emotional Intelligence Theory

With regard to emotional intelligence, Daniel Goldman was not the first to articulate the concept. However, in the double role of psychologist and journalist, Goleman made the elements of emotional intelligence accessible to broad segments of society. His best-selling books — beginning with "Emotional Intelligence"(1995) — have already changed how some businesses interact with clients and some managers recruit employees. His impact has been even more profound on education.

Thanks to Goleman, educators now recognize that emotional intelligence is every bit as important to learning as intellectual prowess or IQ. As a result, tens of thousands of schools throughout the world currently incorporate "social and emotional learning" in

their curricula. In some schools, courses geared toward developing emotional intelligence are mandatory.

Goleman's five components of emotional intelligence

Goleman broadened Mayer's and Salovey's four-branch system to incorporate five essential elements of emotional intelligence — or EQ, the shorthand he sometimes uses:

- Emotional self-awareness — knowing what one is feeling at any given time and understanding the impact those moods have on others
- Self-regulation — controlling or redirecting one's emotions; anticipating consequences before acting on impulse
- Motivation — utilizing emotional factors to achieve goals, enjoy the learning process and persevere in the face of obstacles
- Empathy — sensing the emotions of others
- Social skills — managing relationships, inspiring others and inducing desired responses from them

Applications for educators

There are very practical reasons to promote social and emotional learning in schools, from kindergarten through college. According to Goleman, bullying, disciplinary problems, violence and drug abuse are reduced in schools with a high EQ. With a solid basis in emotional intelligence, academic performance — as well as behavior — improves. There is an obvious connection to Goleman's third, motivational component: learning stimulates curiosity and promotes feelings of satisfaction, even joy, when students immerse themselves in the process of assimilating new information.

The EQ of children starts developing long before they ever enter a classroom. But EQ levels will vary widely, depending on each child's home environment. Thus teachers must be able to recognize those children whose emotional literacy needs a boost. Teachers should be ready to talk about feelings in the classroom. The message is that no emotion is "wrong," but certain ways of expressing those emotions or acting on them are indeed inappropriate.

In 2002, UNESCO launched an international campaign to promote emotional learning in the classroom. The U.N. body sent a statement of 10 basic EQ principles to education ministries throughout the world. Those principles drew heavily from Goleman's exposition of emotional intelligence.

Rating emotional intelligence

PositivePsychology.com has created a guide to help people assess their own levels of emotional intelligence. Discover exercises ranging from classifying facial expressions, emotional articulation tools, and communication tasks among other activities. These are suitable for students and adults alike.

Das, Kar & Parrila Theory

PASS Cognitive Processes Das and his colleagues (Das et al., 1975; Das, Parrila, & Kirby, 1994) have offered the Planning, Attention, Simultaneous and Successive processing (PASS) theory as an alternative to the conceptualization of intelligence as a general mental ability. The popular approach to theory of human intelligence that considers human intellectual functioning as a single unitary quality underlying all cognitive processes (g) provides

ideology for PASS theory of Intelligence. It challenges g-theory on the grounds that neuropsychological research has consistently demonstrated that the brain is made up of interdependent, but separate functional systems. Specifically, the PASS theory is based on the view that intelligence is composed of multiple inter-dependent cognitive processes.

The PASS theory has evolved through many years of theoretical and empirical work. Initially proposed and described as an information processing model derived from Luria (Das, 1973; Das, Kirby, & Jarman, 1975) and then as information-integration model (Das, Kirby, & Jarman, 1979),

later the model was called the PASS model (Naglieri & Das, 1988, 1990). Further it was elaborated by Das, Naglieri and Kirby (1994); and Das, Kar and Parrila (1996) and referred to as PASS theory of intelligence. Das et al. (1994) believed that it has a strong theoretical foundation, has been sufficiently operationalized and is making significant contributions to the understanding of exceptionality and predict academic as well as job performance. This view of intelligence is based on a neuropsychological work of Luria (1966, 1973) as well as cognitive psychological findings (Hunt & Lansman, 1986).

According to Luria, human cognitive processing involves three functional systems that work in concert and whose participation is necessary for any type of mental activity (1973, p.43). The first functional unit is responsible for regulating cortical tone and maintenance of attention. The second unit receives, processes and stores information using simultaneous and successive information coding and the third unit programs, regulates and directs mental activity. The first functional unit is associated with the brainstem, diencephalon and medial regions of the hemispheres.

This is the base of human mental processes, because it maintains a proper state of arousal which allows for the focus of attention. The arousal aspect of the first functional unit is important because it provides the opportunity for the voluntary action of attention. Arousal is responsible for cortical tone and wakefulness and also attention which is more of a complex cognitive activity.

Given an appropriate state of arousal, the two broad classes of selective and divided attention (Kahneman & Treisman, 1984) may occur. Any task involving the intentional discrimination between stimuli requires selective attention, which is important activity of the first functional unit. The second unit's functions are regulated by the occipital, parietal and temporal lobes posterior to the central sulcus.

The cognitive functions of this unit are receiving, processing and retaining information which a person obtains from the external world. Luria (1966) stated that there is a strong evidence for distinguishing the two basic forms of integrative activity of the cerebral cortex, by which different aspects of the outside world may be reflected.

These two types of processes are simultaneous processes which integration of stimuli into synchronous and primarily spatial groups and successive process which consists of integration of stimuli into temporally organized serial order. The third functional unit described by Luria (1973) allows the individual to form plans of action, carry them out and verify the effectiveness of the plans. It relies on the second functional unit for processing components and the first functional unit for proper attentional status.

With the prerequisite functioning of these units, the individual can develop plans of action, inspect performance and regulate behaviour so that it conforms to the plans and then compare the

effects of these actions with the original intention so that correction of mistakes is possible.

The third functional unit is also responsible for activities such as impulse control, regulation of voluntary actions and linguistic functions such as spontaneous speech (Luria, 1980, p. 517). Das (1984) and Arlin (1977) suggested that planning is the essence of human intelligence, as it involves the aptitude for asking new questions, solving problems and self-monitoring as well as the application of information coding processes.

Planning-

This is the ability to make decisions about how to solve problems and perform actions. It involves setting goals, anticipating consequences and using feedback. Planning also involves the attentionarousal, simultaneous and successive processing functions and is associated with the frontal lobes of the brain. Planning processes provide the individual with the facility to determine and utilize an efficient way to solve a problem through the application of attention, simultaneous and successive processes in conjunction with the base of knowledge.

The three main aspects of planning are generation, selection, and execution. If more than one plan is found, selecting the best one is important and monitoring the effectiveness of these solutions is always needed.

Attention-Arousal-

This involves the ability to selectively attend to stimuli while ignoring other distractions. Individuals with Attention Deficit Disorder (ADD) have impairments in this area. The arousal functions are generally associated with the brain stem and thalamus, whereas the

higher attentional processes are thought to be related to the planning functions of the frontal lobe.

Simultaneous Processing-

This involves the ability to integrate separate stimuli into a cohesive, interrelated whole. Simultaneous processing is necessary for language comprehension, as in: "Who is the person in the following statement: My mother's father was his only son (Naglieri & Das, 1997)?" The occipital and parietal lobes are thought to be important for these functions.

It also involves the integration of stimuli into groups or the recognition that a number of stimuli share a common characteristic. Both of these aspects require that all the stimuli be related to one another. Simultaneous processing may take place with perceived stimuli, remembered stimuli or the conceptual aspects of stimuli (Naglieri, 1985).

Successive Processing-

This involves the ability to integrate stimuli into a sequential order. An example of this process is the sequencing of letters and words in reading and writing. This type of processing is believed to be related to frontal-temporal lobe functioning (Das, 2002). The critical part of successive processing is that elements must be ordered without surveyability. In successive processing elements are only linearly related. Successive coding is needed for skilled movements because such activity requires a series of movements which follow each other in a strictly defined order without surveyability (Luria 1966, p. 78).

In the early stages of the skilled movement each successive link exists as a separate unit and may be taught as a specific step in a

larger behaviour. Only when each aspect becomes automatic can the initial stimulus in the chain become the signal that leads to the automatic execution of the complete successive action.

Because the PASS processes are interactive, they act in concert to provide specific functions to virtually all tasks performed in everyday life. However, all the processes are not equally involved in all the tasks. A close relationship has been described by Luria (1980), and Stuss, Benson et al. (1986) between planning and attention. It results from large number of neural connections between the first and third functional units in the brain.

Planning requires an adequate state of arousal so that attention can be focused. An appropriate level of activation, attention and arousal is needed so that a plan of action can be generated and utilized. A similar strong correlation between coding and planning exists. Real life tasks can be coded in different ways. How one manages the information is a planning function that influences the coding approach used (Lawson & Kirby, 1981; Kirby & Das 1978; Kirby & Lawson, 1983).

Planning processes are believed to be distinct from simultaneous, successive and attentional processes because they provide the individual the means to analyse cognitive activity, develop some method to solve a problem, evaluate the effectiveness of a solution, and modify the approach used as needed. These processes are necessary when an efficient and systematic approach to solving a problem is required. The output component of the PASS processes is a complex function by itself. Simultaneous processes may predominate in the solution of a task, but motor programming may be required if the response is written one.

An individual may have competence in processing, but fail to come up with the motor program required to respond. This can be a problem in special groups such as brain damaged and mentally handicapped individuals.

Research by Das (e.g., Das 1972; Das, Kirby, & Jarman, 1975; 1979) has clearly shown that the simultaneous and successive information coding component of the PASS processes has construct validity. These researchers and others have found simultaneous and successive factors and evidence of developmental differences by chronological and mental age using tests such as progressive matrices, memory for designs and figure copying (simultaneous), and digit span forward, sound blending and sentence repetition (successive). The studies have involved samples of elementary and middle school-aged students (Das, 1972, 1973; Das & Molloy, 1975; Garofalo, 1986; Jarman & Das, 1977; Kirby & Das, 1978; Kirby & Robinson, 1987; Naglieri & Das, 1988), high-school aged samples (Naglieri & Das, 1988), and adults (Das & Heemsbergen, 1983; McCallum, & Merritt, 1983; Merritt & McCallum, 1983; Wachs & Harris, 1986; Ashman, 1982).

PASS and other Cognitive Theories of Intelligence Contemporary theories about intelligence can be divided into two classes, psychometric and cognitive. Some of the main followers of the alternative approach of cognitive intelligence have been Jensen (1970, 1980) and Das et al. (1975, 1977). Jensen (1968, 1970) postulated the notion of two-level theory of mental abilities to account for the differences in cognitive test performance of certain racial and social class groups.

Level I ability is described as an associative ability in which the correspondence between stimulus information response output is relatively simple and direct. In contrast, Level II ability is described

as conceptual ability in which the original stimulus information for learning is transformed and elaborated before the response can be made. Level I and Level II can be taken as two poles of continuum along which tasks can be arranged in terms of degree of complexity of cognitive demands. Das's PASS model observed that a number of inconsistencies in Level I/II data could be interpreted with knowledge of types of transformation (e.g.,

simultaneous and successive) rather than amount of information transformation (Level I and II). Jarman (1978) took some issues and stated that the evidence indicating that memory tasks are performed using various strategies raised question regarding validity of labeling Level I position to different memory tasks.

What is Creativity: Torrance, Getzels & Jackson, Guilford, Wallach & Kogan Relationship between Intelligence and Creativity?

Creativity: Torrance, Getzels & Jackson, Guilford, Wallach & Kogan Relationship between Intelligence and Creativity

Creativity theory by torrance

The TTCT (Torrance Tests of Creative Thinking) assess how creatively a child's mind works and are often given to children in order to determine advanced placement or as part of an entrance examination. They are very different from the intelligence and

reasoning tests your child may already have taken. Instead of traditionally taught subjects such as reading or math, these tests assess creativity. Children are scored on a number of aspects, including creative titles for pictures, expressions, imagery and humor.

Therefore, your child hasn't "learned" the content that will be tested on the Torrance, since it involves more ambiguous concepts than the ones that are driven home in the classroom. As the name suggests, the Torrance Tests of Creative Thinking test, in large part, how creative and imaginative your child is.

The Torrance Tests of Creative Thinking (TTCT) is designed to identify and evaluate creative potential using two parts – a Verbal test and a Figural test.

- The **Verbal test** contains seven subtests – Asking, Guessing Causes, Guessing Consequences, Product Improvement, Unusual Uses, Unusual Questions, and Just Suppose. Subtests are scored on the basis of fluency, flexibility, and originality (with a score on elaboration as optional), and these scores are accumulated across all subtests. The totals may be converted to standard T scores if normative reference is desired.
- The **Figural test** has three subsets – Picture Construction (from a marked cue), Picture Completion (again with cues), and Parallel Lines. The first of these subtests is scored on originality and elaboration while the remainder are scored on fluency, flexibility, originality, and elaboration. Totals are then accumulated across subtests to provide overall scores for Figural fluency, flexibility, originality, and elaboration. These

scores, as in the Verbal test, can be converted to a standard T score.

More Information on the Torrance Test

The tests are game-like to catch children's interests. The scoring of the tests is by hand and require careful attention to the manual for reliable results. However, "streamlined" guides are available and are helpful in developing greater familiarity with the test and its scoring procedures. Grades K through graduate school.

Many school districts include some kind of creativity testing as part of their assessment of gifted children. One of the most common tests used to assess creativity in a child or an adult is the Torrance Tests of Creative Thinking. The TTCT test is a series of figural exercises (thinking with pictures) and verbal activities (thinking with words) that students do to showcase their creative abilities. The full test is a series of individual exercises that are administered by a psychologist over a 90-minute period. While it isn't the perfect creativity test, it has proved to be highly reliable over the years as a predictor of successful, creative individuals of all ages.

This test is used by both businesses and schools. Often, in a school setting, a few of the exercises from the TTCT test are chosen to be administered along with other intelligence or achievement tests. They might choose one figural and one verbal activity to include in their evaluation if they are looking for children who are both highly creative and intelligent to be part of their program.

Getzels and Jackson theory of creativity

The study which had a great impact on psychologists in the field of education and which had set off a boom in research into the area of creativity was the study of 449 high school children in Chicago, published by J. W. Getzels and P. W. Jackson in 1962. They compared a group of middle-class adolescent pupils who had scored well on intelligence tests with pupils who scored well on creativity tests designed by Guilford.

They found that highly creative children were superior in scholastic achievement to pupils with high I.Q., although the high creatives had 20 I.Q. points lower than the high I.Q. students - indicating a positive relationship between creativity and academic ability.

The high creatives, although having an average I.Q. 5 points less than their school population taken as a whole performed better in school achievement. Getzels and Jackson's (1962) study drew criticisms as to its design and the sampling procedures employed. But the educational implications of Getzels and Jackson's study were undeniable. Several research studies replicated the study on other samples. Torrance (1962), for example, undertook eight replications of this famous study.

Five of these studies were on elementary school students, one at high-school level and two at graduate level. It was found that six of these studies supported the findings of Getzels and Jackson that creativity is related to academic achievement.

The two discrepant studies showed that creativity may be dependent on other factors such as the range of intelligence of the sample studied and the type of school the students attended.

Yamamoto (1964a) replicated Getzels and Jackson's (1962) study on 272 ninth through twelfth grade students of the University of Minnesota High School. The students in each grade were grouped

into three groups based on their level of creativity and intelligence scores. The groups were the high intelligence group (comprising students in the upper 20% on IQ but not in the upper 20% on creativity scores), the high creative group (comprising students in the upper 20% on creativity scores but not in the upper 20% on IQ) and the high intelligent-high

creative group which comprised students in the upper 20% on both the I.Q. and creativity measures. On analyzing the academic achievement scores of these groups, Yamamoto (1964a) found no difference in academic achievement between the high creatives and the high I.Q. groups although there was a mean difference of twenty I.Q. points.

The creatives seem to be able to “compensate” for what they lack in intelligence by their creative ability to attain similar level of academic achievement. Other researchers like Ahrens (1962), Jacobson (1966), Lucht (1963), Feldhusen, Treffinger and Elias (1970) have come out in support of the Getzels and Jackson phenomenon. Researchers who used the Grade Point Average as a measure of academic achievement, namely, Taylor (1958), Nuss (1961), Parker (1979), Wilson (1968) and Cline, Richards and Needham (1963) have also reported results consistent with the findings of Getzels and Jackson. However, there are studies that did not support the Getzels and Jackson phenomenon of equivalent achievement of the high creative and the high I.Q groups. Among the earliest were the discrepant studies reported by Torrance (1962) based on his replications of the Getzels and Jackson's study.

Many reasons were put forward to explain this. Among them were the lower level of intelligence among the subjects studied, the different kinds of academic ability measured and to the presence of an I.Q. threshold in the relationship between creativity and

academic achievement. This study intends to further investigate this phenomenon using Form Four (US Grade 10) Malaysian students to explore if this phenomena is prevalent in other cultures.

Procedure Subjects totaling 467 Form Four students were drawn from three secondary schools in the township of Kuantan, in the state of Pahang in Malaysia. Their average age was 13.3 years and the students had undergone six years of primary and three years of secondary school

Discussion

The equivalent academic achievement scores obtained by the HI-LC and LI-HC groups support the findings reported by Getzels and Jackson (1962), Torrance (1959) and Yamamoto (1964a). The fact that similar findings are obtained in another culture with a different education system after a lapse of about 40 years adds to the generalizability of this phenomenon of positive correlation between creativity and academic achievement across culture and time. The similarity in achievement scores among the HI-HC and LI-HC groups further supports the contribution of creativity to academic achievement.

The fact that students not in the top 20% in IQ are able to achieve just as well as students in the top 20% in IQ possibly due to their elevated creativity, may be considered a significant finding in this research. This finding also provides empirical evidence and support for the advocacy of creativity enhancing curricula and programs in Malaysia. At very high IQ levels, the strength of the relationship between creativity and academic achievement appears to diminish.

This finding appears to support the threshold concept in this relationship. It appears that above an intelligence threshold of about 140, creativity may not enhance academic achievement. However,

this finding appears to contradict Yamamoto's (1964b) study which found that above the IQ level of 120, creativity would enhance academic achievement. It may be concluded that while the intelligence threshold concept appears to hold true, the nature of the relationship between creativity and academic achievement both above and below the threshold appears to differ in this Malaysian sample.

Further research involving different samples and different measures of creativity, intelligence and academic achievement will throw more light on these relationships and the concept of intelligence threshold.

Conclusion

This paper provides empirical support for the positive relationship between creativity and academic achievement and the finding that this relationship appears to differ across the intelligence continuum.

This relationship appears to be positive until an intelligence threshold of around 140 above which it appears to diminish. Further studies need to be carried out to confirm the nature of this relationship for other measures academic achievement and across other cultures to establish the generalizability of this finding.

Theories of Creativity on The Basis of Guilford

Before I am able to explain several of the leading theories of creativity, one must understand a confusing intricacy surrounding this topic of study. What is different about the study of creativity is that in other fields of research the newest theory often replaces the older theories. The newest theory is often deemed as being "more correct" than the previously held school of thought. However when

researching creativity, one might find that there are a multitude of theories that are seen as "correct".

The theories themselves each argue that creativity is caused by different factors. They each argue that the components of creativity are different. Interestingly enough, they each are correct in their own respect.

Now this may seem a tad confusing, but because creativity is a such a dynamic concept many theories are only able to define creativity in one particular field or career at one specific point in time (i.e. creativity among engineers, creativity among artists, etc.) That being said, it is important to view each model of creativity only as a single perspective among many perspectives.

Guilford's Structure of Intellect Model and Model of Creativity

One of the earliest models of creativity was created by a man named J. P. Guilford. Originally, Guilford was trying to create a model for intellect as a whole, but in doing so also created a model for creativity. Guilford hypothesized that every mental task was made up of three separate parts: an operation, a content, and a product. He stated that there were five types of operations, four types of content, and six types of products adding to a total of one hundred and twenty different types of possible metal tasks (he would later expand this number to one hundred and eighty different mental tasks, but for now let's focus on the original one hundred and twenty.) Of these one hundred and twenty different mental tasks Guilford identified one specific operation as "divergent production" and marked it as being a vital component of creativity. This divergent production coupled with a content and a product

created twenty four possibilities that Guilford labeled collectively as "divergent thinking".

By labeling this group of mental tasks as divergent thinking Guilford made an important assumption for creative research: creativity isn't one abstract concept. The idea that creativity is a category rather than one single concept opened up the ability for other researchers to look at creativity with a whole new perspective. Additionally, Guilford hypothesized one of the first models for the components of creativity. He explained that creativity was a result of having:

1. Sensitivity to problems, or the ability to recognize problems.

2.Fluency, which encompasses

-a. Ideational fluency, or the ability rapidly to produce a variety of ideas that fulfill stated requirements.

-b. Associational fluency, or the ability to generate a list of words, each of which is associated with a given word.

-c. Expressional fluency, or the ability to organize words into larger units, such as phrases, sentences, and paragraphs.

3. Flexibility, which encompasses

-a. Spontaneous flexibility, or the ability to demonstrate flexibility.

-b. Adaptive flexibility, or the ability to produce responses that are novel and high in quality

This represents the base model by which several researchers would take and alter to produce their new theories of creativity years later. This base theory stated that creativity was a result of of cognitive ability (intellect) alone. As Guilford was originally only studying intellect, it is not strange that he categorizes creativity as just a specific subset of cognitive ability.

After Guilford's initial model, researchers would begin to categorize and re-categorize mental ability into subsets that would further hypothesize how mental ability was broken up (as shown in the image to the left). These models would help others understand and put into place one specific part of creativity that Guilford brought to light: the intellectual requirement.

Kerrie Unsworth's "Unpacking Creativity"

Moving on from Guilford's model of cognitive ability, Kerrie Unsworth proposed that there was more than just raw intelligence that influenced the creative process. Unsworth argues that context was just as important of a factor of creativity as cognitive ability was. Specifically, Unworth looked two aspects of context: The problem type and motivation. Unsworth broke down each of these ideas into two categories to better explain each context affects the creative

process.

In differentiating the type of problem, Unsworth separated cases based on whether or not a given problem was known. Where closed problems are instances when a problem is clearly defined, open problem must be discovered and searched for. The first step in dealing with open problems is that one needs to discover what the problem is before they can fix it.

Regarding motivation, Unsworth differentiated types of motivation based off of what the source of the driving action was. This means that the motivation could either be internally or externally driven.

Using the different types of motivation and problems, Unsworth created a matrix (pictured above) that broke down creativity into four arch-types:

Responsive creativity: Externally driven with a closed problem

type, this type of creativity has the least amount of opportunity for creative input, but is often seen in occupational and professional scenarios.
Expected creativity: Externally driven with an open problem type, this type of creativity is most often seen in art and poetry where the problem is self- discovered.
Contributory creativity: Internally driven with a closed problem type, this type of creativity often deals with volunteer behaviors as the problem is known, but an individual exercising contributory creativity is doing so on their own will and not being forced by an extrinsic motivator.
Proactive creativity: Internally driven with a open problem type, this creativity is when dealing with an uncertain problem that must be

found. Often synonymous with spontaneous creativity as a problem wasn't apparent, but was found and creatively fixed.

Through this model, Unsworth shed light on the important topic that is context. As she specifically states, "There are many theories concerning the creative process, yet the proposition that the process may change depending upon the type of creativity has not been considered" (Unsworth, 294). This is to say that just as Guilford offered cognitive ability as a component of creativity, context is another factor that shapes and mold types of creativity. Additionally, Unsworth made the distinction between innovation and creativity that I had not seen explained before. She explains that innovation is used in regards to the implementation of ideas whereas creativity describes only the generation of ideas.

The Personality Connection

Apart from intelligence and context, there is one other leading theory to explain the components of creativity: The personality factor. While being closely related to cognitive ability, personality is another internal factor that affects the creative process. This theory breaks down how personality effects creativity into two options: Little-C: Creativity that can be seen in your everyday life, but these are usually small little opportunities to adapt and change to fit a situation. Big-C: Significant change that affects how others think, feel, and live their lives.

Depending on what kind of personality one has determines what effect it will have on the creative process. For example, say that someone has found a new way to dust shelves. The new method

takes half of the normal time of dusting. Now, the little-C personality might think to themselves that this is a creative way for them to go about cleaning the house, and it will even save them a solid hour of cleaning each week. On the other hand, the big-C personality might realize that the implications of this creative breakthrough. By sharing this news with the world and garnishing support behind this new method, people everywhere might be saving millions of hours collectively dusting their shelves. The creative idea is the same in both cases, however one scenario affects just one individual, while the other situation affected millions of people. The difference is in the personality.

One of the main ways that personality is measured is through J.M. Digman's Big-5 personality traits or OCEAN: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Digman uses these traits to categorize personality types into measurable quantities. While it is not clear how each of these individual traits affect the creative process, the main point is that personality in its entirety has an influence of the creative process.

Takeaways From the Creative Theories

The evolution of creative theory has brought our understanding of what creativity is from Guilford's solely cognitive representation in the 1900's to our modern day model that includes intellect, context (problem type and motivation), and personality each as factors of influence. Again, I would like to reiterate that each of these models are correct in and of themselves. Each individual theory is correct not only because the next theory builds off the previous one, but also because they each help explain the creative process for different fields. For instance, personality plays less of a role than cognitive ability in the creative process when trying to find a new

way to wield two pieces of metal together. However when trying to find a new way to creatively get votes for a politician, personality might have a much larger role than cognitive ability.

Creativity Misconceptions

While I believe that each of these theories have evolved and changed our fundamental understanding of creativity, some would argue that our overall perceptions and understanding of creativity has not changed. Some would say that while a few components of creativity have changed, our overlying view of creativity as a whole has not changed. This is a common misconception about creativity. Originally, creativity was thought to be one individual trait that could be measured in the same way that base intellect and physical strength are measured. However due to the research in the above theories and models, the fundamental components of creativity have in fact changed. This change in the rudimentary parts of the creative process has caused our overarching view of creativity to switch from viewing it as a personality trait to being a broad category that better encompasses all types of creativity than a singular model could ever hope to.

Why So Many Theories?

The main point these theories attempt to display is that creativity is a dynamic concept with a multitude of sub-types of creativity. Because creativity is as dynamic and diverse as previously stated, the need for multiple theories to be correct to fit any given context arises. Now that we understand that there are many different components, parts, and perspectives on what creativity is, I would like to piece together the core arguments in each of these theories to define creativity, not as an single entity, but as an broad category.

Wallach kogan creativity test

In Wallach and Kogan's assessment of creativity, examinees are asked to come up with many possible items that are in a general group.

For example: Name things with wheels.

Responses could be:

- a car
- a bicycle
- a lorry
- a train
- a go-cart
- a skateboard
- a scooter
- your mind

This test is scored using four components:

1. Fluency

The number of responses is calculated. In the above example, the score would be 8.

2. Flexibility

The number of different categories is calculated. The above example would score 2; the first seven are all methods of

transportation but “wheel turning in your mind” is a different category, e.g. a metaphor.

3. Originality

Each response is compared to the total amount of responses from all of the people given the test.

Responses that were given by only 5% of the group are unusual (1 point).

Responses that were given by only 1% of the group are unique (2 points). Higher total scores indicate an aptitude for original thinking.

4. Elaboration

The amount of detail is assessed. For example, “a scooter” = 0, whereas “an electric scooter racing down the pavement” = 1

An additional point would be given if the examinee noted where the scooter car was going.

In terms of administration, Wallach and Kogan’s test can be done by anyone and there is no special training needed. Typically the test is administered in a classroom setting.

Here are some more examples:

1. Name all the round things you can think of.
2. Name all the things you can think of that will make a noise.
3. Name all the square things you can think of.
4. Name all the things you can think of that move on wheels.

One of my favourite tests is focuses on similarities where children have to think of as many possible similarities between two objects.

Examples:

1. Tell me all the ways in which an apple and orange are alike.
2. Tell me all the ways in which a cat and mouse are alike.
3. Tell me all the ways in which milk and meat are alike.
4. Tell me all the ways in which a radio and a telephone are alike.

Example answers for apple and orange: both round, sweet, have seeds, are fruit, grow on trees, have skins, etc.

This has developed into an active assessment strategy called 'reasoning by analogy' which commonly uses a graphic organiser to identify similarities between objects or events, such as structural or functional similarities. They are used to illustrate some sort of relationship between things being compared.

In the book Start Thinking by Marcelo Staricoff and Alan Rees, they provide an example of reasoning by analogy that also asks students to consider differences.

What are the similarities and differences between blood and tomato ketchup?

Similarities include: both a red, both have sugar in them, both are used by people etc

Differences include: blood is thinner, blood is darker, ketchup is made in a factory, etc

Relationship between Intelligence and Creativity

Intelligence is a complex characteristic of cognition. Many theories have been developed to explain what intelligence is and how it

works. There's Sternberg's triarchic theory of intelligence that focuses on analytical, creative, and practical intelligence, but there is also Gardner's theory which holds that intelligence is comprised of many factors. Still other theories focus on the importance of emotional intelligence. **Classifying Intelligence**

What exactly is intelligence? The way that researchers have defined the concept of intelligence has been modified many times since the birth of psychology. British psychologist Charles Spearman believed intelligence consisted of one general factor, called g, which could be measured and compared among individuals. Spearman focused on the commonalities among various intellectual abilities and de-emphasized what made each unique. Long before modern psychology developed, however, ancient philosophers, such as Aristotle, held a similar view (Cianciolo & Sternberg, 2004).

Others psychologists believe that instead of a single factor, intelligence is a collection of distinct abilities. In the 1940s, Raymond Cattell proposed a theory of intelligence that divided general intelligence into two components: crystallized intelligence and fluid intelligence (Cattell, 1963). **Crystallized intelligence** is characterized as acquired knowledge and the ability to retrieve it. When you learn, remember, and recall information, you are using crystallized intelligence. You use crystallized intelligence all the time in your coursework by demonstrating that you have mastered the information covered in the course. **Fluid intelligence** encompasses the ability to see complex relationships and solve problems. Navigating your way home after being detoured onto an unfamiliar route because of road construction would draw upon your fluid intelligence. Fluid intelligence helps you tackle complex, abstract challenges in your daily life, whereas crystallized intelligence helps you overcome concrete, straightforward problems (Cattell, 1963).

Other theorists and psychologists believe that intelligence should be defined in more practical terms. For example, what types of behaviors help you get ahead in life? Which skills promote success? Think about this for a moment. Being able to recite all 44 presidents of the United States in order is an excellent party trick, but will knowing this make you a better person?

Robert Sternberg developed another theory of intelligence, which he titled the **triarchic theory of intelligence** because it sees intelligence as comprised of three parts (Sternberg, 1988): practical, creative, and analytical intelligence (Figure 1).

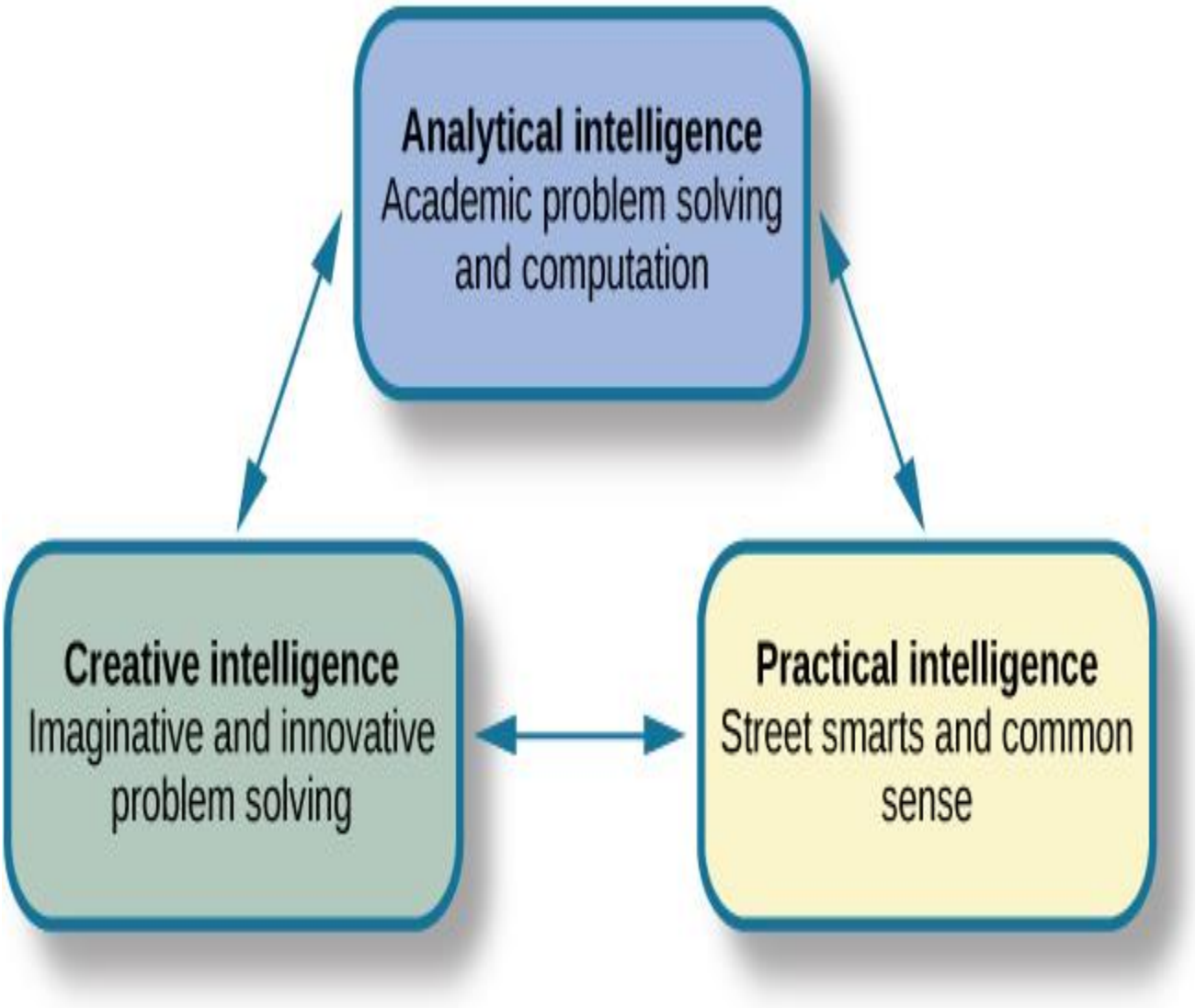

Figure 1. Sternberg's theory identifies three types of intelligence: practical, creative, and analytical.

Practical intelligence, as proposed by Sternberg, is sometimes compared to "street smarts." Being practical means you find solutions that work in your everyday life by applying knowledge based on your experiences. This type of intelligence appears to be separate from traditional understanding of IQ; individuals who score high in practical intelligence may or may not have comparable scores in creative and analytical intelligence (Sternberg, 1988).

This story about the 2007 Virginia Tech shootings illustrates both high and low practical intelligences. During the incident, one student left her class to go get a soda in an adjacent building.

She planned to return to class, but when she returned to her building after getting her soda, she saw that the door she used to leave was now chained shut from the inside. Instead of thinking about why there was a chain around the door handles, she went to her class's window and crawled back into the room. She thus potentially exposed herself to the gunman. Thankfully, she was not shot.

On the other hand, a pair of students was walking on campus when they heard gunshots nearby. One friend said, "Let's go check it out and see what is going on." The other student said, "No way, we need to run away from the gunshots." They did just that. As a result, both avoided harm.

The student who crawled through the window demonstrated some creative intelligence but did not use common sense. She would have low practical intelligence. The student who encouraged his friend to run away from the sound of gunshots would have much higher practical intelligence.

Analytical intelligence is closely aligned with academic problem solving and computations. Sternberg says that analytical intelligence is demonstrated by an ability to analyze, evaluate, judge, compare, and contrast. When reading a classic novel for literature class, for example, it is usually necessary to compare the motives of the main characters of the book or analyze the historical context of the story.

In a science course such as anatomy, you must study the processes by which the body uses various minerals in different human systems. In developing an understanding of this topic, you are using analytical intelligence. When solving a challenging math problem, you would apply analytical intelligence to analyze different aspects of the problem and then solve it section by section.

Multiple Intelligences Theory was developed by Howard Gardner, a Harvard psychologist and former student of Erik Erikson. Gardner's theory, which has been refined for more than 30 years, is a more recent development among theories of intelligence. In Gardner's theory, each person possesses at least eight intelligences. Among these eight intelligences, a person typically excels in some and falters in others (Gardner, 1983). The following table describes each type of intelligence.

Intelligence Type	**Characteristics**
Linguistic	Perceives different functions of language, different

Intelligence Type	Characteristics
intelligence	sounds and meanings of words, may easily learn multiple languages
Logical-mathematical intelligence	Capable of seeing numerical patterns, strong ability to use reason and logic
Musical intelligence	Understands and appreciates rhythm, pitch, and tone; may play multiple instruments or perform as a vocalist
Bodily kinesthetic intelligence	High ability to control the movements of the body and use the body to perform various physical tasks
Spatial intelligence	Ability to perceive the relationship between objects and how they move in space

Intelligence Type	Characteristics
Interpersonal intelligence	Ability to understand and be sensitive to the various emotional states of others
Intrapersonal intelligence	Ability to access personal feelings and motivations, and use them to direct behavior and reach personal goals
Naturalist intelligence	High capacity to appreciate the natural world and interact with the species within it

Multiple Intelligences

Gardner's theory is relatively new and needs additional research to better establish empirical support. At the same time, his ideas challenge the traditional idea of intelligence to include a wider variety of abilities, although it has been suggested that Gardner simply relabeled what other theorists called "cognitive styles" as "intelligences" (Morgan, 1996). Furthermore, developing traditional

measures of Gardner's intelligences is extremely difficult (Furnham, 2009; Gardner & Moran, 2006; Klein, 1997).

Gardner's inter- and intrapersonal intelligences are often combined into a single type: emotional intelligence. **Emotional intelligence** encompasses the ability to understand the emotions of yourself and others, show empathy, understand social relationships and cues, and regulate your own emotions and respond in culturally appropriate ways (Parker, Saklofske, & Stough, 2009). People with high emotional intelligence typically have well-developed social skills. Some researchers, including Daniel Goleman, the author of Emotional Intelligence: Why It Can Matter More than IQ, argue that emotional intelligence is a better predictor of success than traditional intelligence (Goleman, 1995). However, emotional intelligence has been widely debated, with researchers pointing out inconsistencies in how it is defined and described, as well as questioning results of studies on a subject that is difficulty to measure and study emperically (Locke, 2005; Mayer, Salovey, & Caruso, 2004)

Intelligence can also have different meanings and values in different cultures. If you live on a small island, where most people get their food by fishing from boats, it would be important to know how to fish and how to repair a boat. If you were an exceptional angler, your peers would probably consider you intelligent. If you were also skilled at repairing boats, your intelligence might be known across the whole island. Think about your own family's culture. What values are important for Latino families? Italian families? In Irish families, hospitality and telling an entertaining story are marks of the culture. If you are a skilled storyteller, other members of Irish culture are likely to consider you intelligent.

Some cultures place a high value on working together as a collective. In these cultures, the importance of the group supersedes the importance of individual achievement. When you visit such a culture, how well you relate to the values of that culture exemplifies your cultural intelligence, sometimes referred to as cultural competence.

Creativity happens when someone comes up with a creative idea. An example would be a creative solution to a difficult problem. But what makes an idea or solution creative? Creativity is the ability to generate, create, or discover new ideas, solutions, and possibilities. Very creative people often have intense knowledge about something, work on it for years, look at novel solutions, seek out the advice and help of other experts, and take risks. Although creativity is often associated with the arts, it is actually a vital form of intelligence that drives people in many disciplines to discover something new. Creativity can be found in every area of life, from the way you decorate your residence to a new way of understanding how a cell works.

Although psychologists have offered several definitions of creativity (Plucker, Beghetto, & Dow, 2004; Runco & Jaeger, 2012), probably the best definition is the one recently adapted from the three criteria that the U.S. Patent Office uses to decide whether an invention can receive patent protection (Simonton, 2012).

The first criterion is originality. The idea must have a low probability. Indeed, it often should be unique. Albert Einstein's special theory of relativity certainly satisfied this criterion. No other scientist came up with the idea.

The second criterion is usefulness. The idea should be valuable or work. For example, a solution must, in fact, solve the problem. An

original recipe that produces a dish that tastes too terrible to eat cannot be creative. In the case of Einstein's theory, his relativity principle provided explanations for what otherwise would be inexplicable empirical results.

The third and last criterion is surprise. The idea should be surprising, or at least nonobvious (to use the term used by the Patent Office).

For instance, a solution that is a straightforward derivation from acquired expertise cannot be considered surprising even if it were original. Einstein's relativity theory was not a step-by-step deduction from classical physics but rather the theory was built upon a new foundation that challenged the very basis of traditional physics.When applying these three criteria, it is critical to recognize that originality, usefulness,

and surprise are all quantitative rather than qualitative attributes of an idea. Specifically, we really have to speak of degree to which an idea satisfies each of the three criteria. In addition, the three attributes should have a zero point, that is, it should be possible to speak of an idea lacking any originality, usefulness, or surprise whatsoever.

Finally, we have to assume that if an idea scores zero on any one criterion then it must have zero creativity as well. For example, someone who reinvents the wheel is definitely producing a useful idea, but the idea has zero originality and hence no creativity whatsoever. Similarly, someone who invented a parachute made entirely out of steel reinforced concrete would get lots of credit for originality—and surprise!—but none for usefulness.

The first is the Remote Associates Test, or RAT, that was introduced by Mednick (1962). Mednick believed that the creative

process requires the ability to associate ideas that are considered very far apart conceptually. The RAT consists of items that require the respondent to identify a word that can be associated to three rather distinct stimulus words. For example, what word can be associated with the words “widow, bite, monkey”? The answer is spider (black widow spider, spider bite, spider monkey). This particular question is relatively easy, others are much more difficult, but it gives you the basic idea.

The second measure is the Unusual Uses Task (Guilford, 1967; Torrance, 1974). Here, the participant is asked to generate alternative uses for a common object, such as a brick. The responses can be scored on four dimensions: (a) fluency, the total number of appropriate uses generated; (b) originality, the statistical rarity of the uses given; (c) flexibility, the number of distinct conceptual categories implied by the various uses; and (d) elaboration, the amount of detail given for the generated uses. For example, using a brick as a paperweight represents a different conceptual category that using its volume to conserve water in a toilet tank. The capacity to produce unusual uses is but one example of the general cognitive ability to engage in **divergent thinking** (Guilford, 1967). Unlike **convergent thinking**, which converges on the single best answer or solution, divergent thinking comes up with multiple possibilities that might vary greatly in usefulness.

Unfortunately, many different cognitive processes have been linked to creativity (Simonton & Damian, 2013). That is why we cannot use the singular; there is no such thing as the “creative process.” Nonetheless, the various processes do share one feature: All enable the person to “think outside the box” imposed by routine thinking—to venture into territory that would otherwise be ignored

(Simonton, 2011). Creativity requires that you go where you don't know where you're going.

UNIT-6 Thinking, Intelligence and Creativity MCQs

DIWAKAR EDUCATION HUB

1. The fundamental purpose for the existence of any organization is described by its
a. policies
b. mission
c. procedures
d. strategy
Ans. B

2. The fundamental purpose of an organization's mission statement is to
a. create a good human relations climate in the organization
b. define the organization's purpose in society
c. define the operational structure of the organization
d. generate good public relations for the organization
Ans. B

3. The acronym SWOT stands for
a. Special Weapons for Operations Timeliness
b. Services, Worldwide Optimization, and Transport
c. Strengths Worldwide Overcome Threats
d. Strengths, Weaknesses, Opportunities, and Threats
Ans. D

4. Which of the following is not a characteristic of strategic management that makes it different from other types of management?
a. It is interdisciplinary.
b. It has an external focus.
c. It has an internal focus.
d. It concerns the present direction of the organization.
Ans. D

5. Which of the following is an issue considered in developing corporate strategies?
a. What business(es) are we in?
b. What direction are we going?
c. What resources do we have to implement our strategies?
d. What businesses are we in and what to do with those businesses?
Ans. C

6. Which of the following is NOT a major element of the strategic management process?
a. Formulating strategy
b. Implementing strategy
c. Evaluating strategy
c. Assigning administrative tasks

Ans. D

7. Competitive advantage can best be described as:
a. increased efficiency.
b. what sets an organization apart.
c. a strength of the organization.
d. intangible resources.
Ans. A

8. _____ is the foundation of blue ocean strategy.
a. Innovation
b. Value creation
c. Value innovation
d. value cost trade-off
Ans. C

9. The various organizational routines and processes that determine how efficiently and effectively the organization transforms its inputs into outputs are called:
a. strengths.
b. core competencies.
c. capabilities.
d. customer value.
Ans. B

10. When defining strategic management the most important thing to remember is that it is:
a. Not as easy as you think
b. Mainly the province of senior managers
c. A living evolving process
d. More conceptual than practical
e. A way of determining responsibilities
Ans. C

11. An organisation's strategy:
a. remains set in place longer than the mission and objectives
b. generally forms over a period of time as events unfold
c. tends to be formed at the same time the mission is developed and objectives are formulated
d. is usually conceived at a single time when managers sit down and work out a comprehensive strategic plan for the next 3-5 years
Ans. B

12. The primary focus of strategic management is:
a. strategic analysis
b. the total organisation
c. strategy formulation

d. strategy implementation.
Ans. B

13. Which of the following is not an advantage of strategic management?
a. It provides organisations with a clearer sense of direction and purpose
b. It helps improve the political, economic, social and technological environment of the organisation
c. It helps orientate management decisions to relevant environmental conditions
d. It helps organisations be proactive rather than reactive
Ans. B

14. Which of the following defines what business or businesses the firm is in or should be in?
a. Business strategy
b. Corporate strategy
c. Functional strategy
d. National strategy
Ans. B

15. Which of the following defines how each individual business unit will attempt to achieve its mission?
a. Business strategy
b. Corporate strategy
c. Functional strategy
d. National strategy
Ans. A

16. Which of the following focuses on supporting the corporate and business strategies?
a. Competitive strategy
b. Corporate strategy
c. Operational strategy
d. National strategy
e. Mission strategy
Ans. C

17. Which one of the following is not a primary task of strategic managers?
a. Establishing strategic objectives
b. Developing the steps to follow in implementing operational level plans
c. Defining the business and developing a mission
d. Developing a strategy
e. Implementing and evaluating the chosen strategy
Ans. B

18. The task of strategy choice involves:
a. developing plans and activities which will improve the organisation's performance and competitive position
b. determining how the organisation can be more market and efficiency oriented
c. monitoring whether the organisation is achieving good financial performance
d. keeping the organisation free of debt
Ans. A

19. Which one of the following is at the core of strategic management?
a. Choosing which organisational objectives to focus on
b. Being alert for opportunities to change work responsibilities
c. Adapting the organisation to a changing external environment
d. Choosing whether to make decisions autocratically or on the basis of participation
Ans. C

20. The corporate level is where top management directs:
a. all employees for orientation
b. its efforts to stabilize recruitment needs
c. overall strategy for the entire organization
d. overall sales projections
Ans. C

21. The three organizational levels are:
a. corporate level, business level, functional level
b. corporate level, business unit level, functional level
c. corporate strategy level, business unit level, functional level
d. corporate strategy level, business level, specialist level
Ans. A

22. Which of the following is an example of competing on quick response?
a. a firm produces its product with less raw material waste than its competitors
b. a firm offers more reliable products than its competitors
c. a firm's products are introduced into the market faster than its competitors'

d. a firm's research and development department generates many ideas for new products
Ans. C

23. Which one of the following is NOT included in the Porter's Five Forces model:
a. Potential development of substitute products
b. Bargaining power of suppliers
c. Rivalry among stockholders
d. Rivalry among competing firms
Ans. C

24. What is meant by the term 'Stakeholder'?
a. A person who is not related with a business.
b. A person who is related with a business.
c. A person who owns a business.
d. A person who purchases the shares of a business.
Ans. B

25. Of the following, which one would NOT be considered one of the components of a mission statement?
a. The target market for XYZ is oil and gas producers as well as producers of chemicals.
b. XYZ shall hire only those individuals who have with sufficient educational levels so as to be of benefit to our customers
c. The customers of XYZ shall include global and local consumers of gas and oil products and domestic users of nontoxic chemicals
d. The technologies utilized by XYZ shall focus upon development of alternative sources of gas and oil so as to remain competitive within the industry
Ans. B

26. The strategic management process is
a. a set of activities that will assure a temporary advantage and average returns for the firm.
b. a decision-making activity concerned with a firm's internal resources, capabilities, and competencies, independent of the conditions in its external environment.
c. a process directed by top-management with input from other

stakeholders that seeks to achieve above-average returns for investors through effective use of the organization's resources.
d. the full set of commitments, decisions, and actions required for the firm to achieve above-average returns and strategic competitiveness..
Ans. D

27. The goal of the organization's_____ is to capture the hearts and minds of employees, challenge them, and evoke their emotions and dreams.
a. vision
b. mission
c. culture
d. strategy
Ans. A

28. A firm's mission
a. is a statement of a firm's business in which it intends to compete and the customers which it intends to serve.
b. is an internally-focused affirmation of the organization's financial, social, and ethical goals.
c. is mainly intended to emotionally inspire employees and other stakeholders.
d. is developed by a firm before the firm develops its vision.
Ans. A

29. The environmental segments that comprise the general environment typically will NOT include
a. demographic factors.
b. sociocultural factors.
c. substitute products or services.
d. technological factors.
Ans. C

30. An analysis of the economic segment of the external environment would include all of the following EXCEPT
a. interest rates.
b. international trade.
c. the strength of the U.S. dollar.
d. the move toward a contingent workforce.
Ans. D

31. Product differentiation refers to the:

a. ability of the buyers of a product to negotiate a lower price.
b. response of incumbent firms to new entrants.
c. belief by customers that a product is unique.
d. fact that as more of a product is produced the cheaper it becomes per unit.
Ans. C

32. Which of the following is NOT an entry barrier to an industry?
a. expected competitor retaliation
b. economies of scale
c. customer product loyalty
d. bargaining power of suppliers
Ans. D

33. Switching costs refer to the:
a. cost to a producer to exchange equipment in a facility when new technologies emerge.
b. cost of changing the firm's strategic group.
c. one-time costs suppliers incur when selling to a different customer.
d. one-time costs customers incur when buying from a different supplier.
Ans. D

34. New entrants to an industry are more likely when (i.e., entry barriers are low when…)
a. it is difficult to gain access to distribution channels.
b. economies of scale in the industry are high.
c. product differentiation in the industry is low.
d. capital requirements in the industry are high.
Ans. C

35. Suppliers are powerful when:
a. satisfactory substitutes are available.
b. they sell a commodity product.
c. they offer a credible threat of forward integration.
d. they are in a highly fragmented industry.
Ans. C

36. The highest amount a firm can charge for its products is most directly affected by
a. expected retaliation from competitors.
b. the cost of substitute products.
c. variable costs of production.

d. customers' high switching costs.
Ans. B

37. All of the following are forces that create high rivalry within an industry EXCEPT
a. numerous or equally balanced competitors.
b. high fixed costs.
c. fast industry growth.
d. high storage costs.
Ans. C

38. According to the five factors model, an attractive industry would have all of the following characteristics EXCEPT:
a. low barriers to entry.
b. suppliers with low bargaining power.
c. a moderate degree of rivalry among competitors.
d. few good product substitutes.
Ans. A

39. Internal analysis enables a firm to determine what the firm
a. can do.
b. should do.
c. will do.
d. might do.
Ans. A

40. An external analysis enables a firm to determine what the firm
a. can do.
b. should do.
c. will do.
d. might do.
Ans. D

41. _____ is/are the source of a firm's_____, which is/are the source of the firm's _____.
a. Resources, capabilities, core competencies
b. Capabilities, resources, core competencies
c. Capabilities, resources, above average returns
d. Core competencies, resources, competitive advantage
Ans. A

42. In the airline industry, frequent-flyer programs, ticket kiosks, and e-ticketing are all examples of capabilities that are
a. rare.
b. causally ambiguous.
c. socially complex.
d. valuable.

Ans. D

43. Firms with few competitive resources are more likely
a. to not respond to competitive actions.
b. respond quickly to competitive actions.
c. delay responding to competitive actions.
d. respond to strategic actions, but not to tactical actions.
Ans. C

44. Competitors are more likely to respond to competitive actions that are taken by
a. differentiators.
b. larger companies.
c. first movers.
d. market leaders.
Ans. D

45. What can be defined as the art and science of formulating, implementing and evaluating cross-functional decisions that enable an organization to achieve its objectives?
a. Strategy formulation
b. Strategy evaluation
c. Strategy implementation
d. Strategic management
e. Strategic leading
Ans. D

46. Which of the following is not a cultural product?
a. Rites
b. Emotions
c. Rituals
d. Sagas
e. Symbols
Ans. B

47. Which individuals are most responsible for the success and failure of an organization?
a. Strategists
b. Financial planners
c. Personnel directors
d. Stakeholders
e. Human resource managers
Ans. A

48. Which of the following is an element of a firm's remote external environment?
a. Competition
b. Political agencies
c. Suppliers
d. Trade union

Ans. B

49. Long-term objectives should be all of the following except:
a. measurable.
b. continually changing.
c. reasonable.
d. challenging.
e. consistent.
Ans. B

50. What are guides to decision making?
a. laws
b. rules
c. policies
d. procedures
e. goals
Ans. C

51. According to Greenley, strategic management offers all of these benefits except that
a. it provides an objective view of management problems.
b. it creates a framework for internal communication among personnel.
c. it encourages a favorable attitude toward change.
d. it maximizes the effects of adverse conditions and changes.
e. it gives a degree of discipline and formality to the management of a business.
Ans. D

52. The vision and mission statement can often be found
a. in the SEC report.
b. in annual reports.
c. on customer receipts.
d. on supplier invoices.
e. on community news bulletins
Ans. B

53. Which group would be classified as a stakeholder?
a. Communities
b. Banks
c. Suppliers
d. Employees
e. All of these
Ans. E

54. The process of performing an external audit needs to include:
a. only top level managers, as it's a planning function.
b. as many managers and employees as possible.
c. primarily front-line supervisors

d. between 15 to 20 managers for it to be valid
e. stockholders and external government agencies
Ans. B

55. Which of the following is not a stage of strategy formulation techniques?
a. Formulation Framework
b. Matching stage
c. External factor evaluation
d. Decision stage
Ans. B

56. ST Strategies is an important strategy to
a. Match weakness with opportunities of the firm
b. Overcome external threats
c. Obtain benefit from its resources
d. Overcome its weakness and reducing threats
Ans. B

57. The immediate external environment includes:
a. Divisions
b. S. B. U. s
c. Competitors
d. Management
Ans. C

58. The_____ comprises economic and social conditions, political priorities and technological developments, all of which must be anticipated, monitored, assessed and incorporated into the executive's decision making.
a. Internal environment
b. Task environment
c. Operating environment
d. Societal environment
Ans. D

59. Strategic management involves the_____, directing, _____ and controlling of a company's strategy-related decisions and actions.
a. Financing; marketing
b. Planning; financing
c. Planning; organizing
d. Marketing; planning
Ans. C

60. A strategy is a company's
a. Value statement
b. Pricing policy
c. Game Plan to outsmart competitor
d. Long-term objective
Ans. C

Ans. C

61. Strategy-formulation concepts and tools
a. Do not differ greatly for different size and type of organizations
b. Differ greatly for different size and type of organizations
c. Do not differ greatly for profit or nonprofit organizations but differ in small and large organizations
d. None of the mentioned options
Ans. A

62. Annual objectives
a. Are not critical to success
b. Serve as guidelines for action, directing and channeling efforts and activities of organization members
c. Are not important for employee motivation and identification
d. Do not provide a basis for organizational design
Ans. B

63. Annual objectives
a. Need not to be consistent
b. Should be easily achievable
c. Should be measurable
d. Should be confidential and not to be communicated throughout the organization
Ans. C

64. Which of the following resources is used by all organizations to achieve desired objectives?
a. Financial resources,
b. Physical resources,
c. Human resources
d. All of the mentioned options
Ans. D

65. Strategic management is
a. A pure science.
b. Based mainly on intuition.
c. Needed mainly when organizational performance falls.
d. Based on the use of quantitative and qualitative information.
Ans. D

66. Large-scale, future-oriented plans, for interacting with the competitive environment to achieve company objectives refers to its
a. Strategy
b. Goals
c. Competitive analysis
d. Dynamic policies
Ans. A

67. Strategic issues require which level of management decisions?
a. Operative
b. Top
c. Front-line
d. Middle
Ans. B

68. Which of these basic questions should a vision statement answer?
a. What is our business?
b. Who are our employees?
c. Why do we exist?
d. What do we want to become?
Ans. D

69._____ is not part of an external audit.
a. Analyzing competitors
b. Analyzing financial ratios
c. Analyzing available technologies
d. Studying the political environment
Ans. B

70. Strategic management process activate in the sequence of_____
a. Environmental scanning, Strategy formulation, Implementation, control and evaluation
b. Strategy formulation, Environmental scanning, Implementation, control and evaluation
c. Environmental scanning, Strategy Implementation, formulation, control and evaluation
d. Strategy formulation, Implementation, control, evaluation, Environmental scanning
Ans. A

71. KAPKAL Power's interested to achieve a 10 percent return on equity (ROE) in their core electric utility, 14 percent ROE on water resource operations, and 15 percent ROE on support businesses. It is _____
a. Mission
b. Strategy
c. Objective
d. Policy
Ans. C

72. "A possible and desirable future state of an organization" is called:
a. Mission
b. Vision
c. Strategy implementation
d. None of above
Ans. B

73. Strategic decisions are based on what managers_____, rather than on what they_____.
a. Know; forecast
b. React to; anticipate
c. Forecast; know
d. Compromise with; analyze
Ans. C

74. "To improve economic strength of society and function as a good corporate citizen on a local, state, and national basis in all countries in which we do business". This is a mission statement that contains:
a. Self-concept
b. Economic concern
c. Products or Services
d. Concern for Public Image
Ans. D

75. Strategic-management audit is known as:
a. Environmental scanning
b. Strategy formulation
c. Strategy control
d. Strategy evaluation
Ans. A

76. Forecasting tools can be broadly categorized into two groups. Those are:
a. Qualitative, Operational
b. Quantitative, Operational
c. Qualitative, Quantitative
d. Regression and time series analysis
Ans. C

77._____ identifies a firm's major competitors and their particular strengths and weaknesses in relation to a sample firm's strategic position.
a. Competitive Profile Matrix
b. External Factor Evaluation matrix
c. Internal Factor Evaluation Matrix
d. Boston consulting group matrix
Ans. A

78. Organizing means an identifiable group of people contributing their efforts towards the attainment of same goal. It is important at the time of:
a. Environmental scanning
b. Strategy formulation
c. Strategy Implementation
d. Strategy evaluation
Ans. C

79. In a turbulent and competitive free enterprise environment, a firm will succeed only if it takes a(n) _____ stance towards change.
a. Reactive
b. Proactive
c. Anti-regulatory or anti-government
d. Vision and not mission
Ans. B

80. Which statement best describes intuition?
a. It represents the marginal factor in decision-making.
b. It represents a minor factor in decision-making integrated with analysis.
c. It should be coupled with analysis in decision-making.
d. It is better than analysis in decision-making.
e. It is management by ignorance.
Ans. C

81. What are the means by which long-term objectives will be achieved?
a. Strategies.
b. Strengths.
c. Weaknesses.
d. Policies.
e. Opportunities.
Ans. A

82. Which of these basic questions should a vision statement answer?
a. What is our business?
b. Who are our employees?
c. Why do we exist?
d. What do we want to become?
e. Who are our competitors?
Ans. D

83. When an industry relies heavily on government contracts, which forecasts can be the most important part of an external audit.
a. economic
b. political
c. technological
d. competitive
e. Multinational
Ans. B

84._____ is not part of an external audit.
a. Analyzing competitors
b. Analyzing financial ratios
q. Analyzing available technologies

d. Studying the political environment
e. Analyzing social, cultural, demographic and geographic forces
Ans. B

85. Which individuals are most responsible for the success and failure of an organization?
a. Strategists
b. Financial planners
c. Personnel directors
d. Stakeholders
e. Human resource managers
Ans. A

86. Long-term objectives should be all of the following except:
a. Measurable.
b. Continually changing.
c. Reasonable.
d. Challenging.
e. Consistent.
Ans. B

87. What are guides to decision making?
a. laws
b. rules
c. policies
d. procedures
e. goals
Ans. C

88. Which group would be classified as a stakeholder?
a. Communities
b. Banks
c. Suppliers
d. Employees
e. All of the given options
Ans. E

89. Typically how many strategic decision levels are in the corporate decision-making hierarchy?
a. 3
b. 4
c. could be more than 5
d. 2
Ans. A

90. Which type of trend can be exemplified by the increasing numbers of two- income households in a society?
a. Social
b. Economic
c. Cultural
d. Technological
Ans. B

91. External assessment is performed in which of the strategic management phase?
a. Strategy formulation stage
b. Strategy implementation stage
c. Strategy evaluation stage
d. All of the given options
Ans. A

92. Political variables have a significant effect on
a. Strategy formulation and implementation
b. Strategy formulation and evaluation
c. Strategy implementation and evaluation
d. Strategy formulation, implementation and evaluation
Ans. A

93. Strategic decisions ostensibly commit the firm for
a. 1 -2 years
b. The short term
c. one years
d. A long time, typically five years
Ans. D

94. Social responsibility is a critical consideration for a company's strategic decision makers since
a. Stockholders demand it
b. The mission statement must express how the company intends to contribute to the societies that sustain it
c. It increases a company's profits
d. It helps make decisions
Ans. B

95. "The perfect search engine would understand exactly what you mean and give back exactly what you want", this statement is included in the mission statement of an online firm and is showing which one of the following components?
a. Self-concept
b. Concern for public image
c. A declaration of attitude
d. Philosophy
Ans. B

96. Which of the following are signs of weakness in a company's competitive position?
a. A return-on-equity is below 25% and earnings per share of less than Rs. 2.00

b. A price set by the firm higher than its rivals
c. A declining market share, poor product quality and few sales in market
d. Lower revenues and profit margin and narrow product line than the market leader
Ans. C

97. It directs at developing new products before competitors do at improving product quality or at improving manufacturing processes to reduce costs.
a. Marketing
b. Opportunity analysis
c. Research and development
d. Management
Ans. C

98. "Identifying and evaluating key social, political, economic, technological and competitive trends and events". Which of the followings best describes this statement?
a. Developing an effective mission statement
b. Conducting an internal audit
c. Performing an external audit
d. Formulating strategy
Ans. C

99. What is the central purpose of strategic evaluation?
a. Evaluate effectiveness of strategy to achieve organisational objectives.
b. Evaluate effectiveness of control system to measure achievements.
c. Evaluate effectiveness of strategies to be implemented efficiently.
d. Evaluate effectiveness of the strategy implementation process.
Ans. A

100. Strategy evaluation at the_____ level involves using specific performance measures-qualitative and quantitative-for each functional area.
a. organizational
b. operational
c. functional
d. production
Ans. c

101. According to Flavell (1977), perception, thinking and reasoning

about humans and human affairs is known as:
(a) Social Cognition
(b) Social Perception
(c) Conceptualization
(d) Socialization
Ans. A

102. When children recognize that each individual is aware of other people's thoughts and feelings, it is called:
(a) Self-reflection
(b) Mutual role taking
(c) Social information role taking
(d) Social and conventional system role taking
Ans. A

103. The shared emotional responses which the child experiences on perceiving other's emotional reactions is known as:
(a) Empathy
(b) Epathy
(c) Mood
(d) Emotional Trauma
Ans. A

104. "Mutual Role Taking Stage" is found among children:
(a) Between the ages 10 and 12
(b) Between the ages 18 and 24
(c) Between the ages 6 and 8
(d) between the ages 2 and 6
Ans. A

105. In which "role taking stage", children realize that there are integrated networks of perspectives such as American or a catholic point of view?
(a) Social and Conventional System of Role Taking
(b) Mutual Role Taking
(c) Self-reflection
(d) Social Informational Role Taking
Ans. A

106. Who concluded in his theory that from ages 5 to about 12, a child's concept of justice passes from moral realism to moral relativism?
(a) W. B. Watson
(b) Sigmund Freud
(c) Jean Piaget
(d) Karniol
Ans. C

107. Around age 11, children think that everyone has equal right to justice and consideration. It is called:

(a) Moral Relativism
(b) Moral Realism
(c) Moral Biting
(d) Moral Consequence
Ans. A

108. Stages of moral development for children were emphasized by:
(a) LB. Watson
(b) E. B. Titchener
(c) Sigmund Freud
(d) Kohlberg
Ans. D

109. Moral Development is related to and dependent upon:
(a) Intellectual Development
(b) Socialization
(c) Learning
(d) Perception
Ans. A

110. Genetic studies of children over varying lengths of time have emphasized the persistence of the two elements of the personality pattern:
(a) The self-concept and traits
(b) Moral development and socialization
(c) Language development and concept formation
(d) Prenatal development and play
Ans. A

111. According to Freud, the period from the end of the oedipal stage around 6 years is called:
(a) Genital Stage
(b) Latency Period
(c) Phallic Stage
(d) Oral Stage
Ans. B

112. A system of learning which was first demonstrated by Tolman in 1932 is known as:
(a) Latent Learning
(b) Trial and Error Learning
(c) Conditioning
(d) Insightful learning
Ans. A

113. A girl who is sexually attracted to members of her own sex is called:
(a) A lesbian
(b) A sexologist
(c) A haterosexual girl
(d) A homosexual girl
Ans. A

114. The term originally used by Freud to refer to sexual energy which is derived from the id and is available to power mental and physical activity is known as:
(a) Ego
(b) Super ego
(c) Libido
(d) Instinct
Ans. C

115. A simplified form of speech that adults adopt when talking to very young children is called:
(a) Motherese
(b) Mothering
(c) Matter
(d) Maturation
Ans. A

116. Bowlby's original idea of the way in which attachment develops between the young infant and its mother is called:
(a) Maternal Drive
(b) Monotrophy
(c) Socialization
(d) Affection
Ans. B

117. The identical twins who are developed from the same fertilized ovum which has subsequently split to develop as two independent Fetus are known as:
(a) Monozygotic Twins
(b) Fraternal Twins
(c) Separated Twins
(d) Socialized Twins
Ans. A

118. The condition in which an adult is sexually attracted to children and can only achieve sexual arousal with them is popularly known as:
(a) Pedophilia
(b) Astabia Abasia
(c) Amnesia
(d) Phobia
Ans. A

119. A term is frequently used in experiments for the level at which a person or animal or a child performs on a particular task. What is it?
(a) Variable
(b) Performance
(c) Hypothesis
(d) Problem
Ans. B

120. The words that children seem to use in the earliest stage of language acquisition are known as:
(a) Symbols
(b) Pivot words
(c) Gestures
(d) Concepts
Ans. B

121. An approach for studying language which concentrates on the functions that language performs rather than on the structure of the language itself is called:
(a) Pragmatics
(b) Psycholinguistics
(c) Concept formation
(d) Symbolism
Ans. A

122. The study of personal space and the use of touch as nonverbal cues in communication is known as:
(a) Concept
(b) Proxemics
(c) Symbol
(d) Gesture
Ans. B

123. The study of psychological aspects of language and the relationships between language and other psychological processes is known as:
(a) Psycholinguistics
(b) Concept formation
(c) Verbal learning
(d) Verbal Accommodation
Ans. B

124. The stage of physical growth during which the child becomes capable of reproduction is called:
(a) Puberty
(b) Maturation
(c) Menstruation
(d) Adolescence
Ans. A

125. The extent to which a message does not provide new information in "Information Theory" is called:
(a) Redundancy
(b) Concept
(c) Construct
(d) Hypothesis
Ans. A

126. A retreat under stress to an earlier psychosexual stage is called:
(a) Aggression
(b) Regression

(c) Rationalization
(d) Rehearsal
Ans. B

127. "One's expectations can have an effect on an outcome that is being observed."—who has given the above statement?
(a) Rosenthal
(b) Wilhelm Wundt
(c) W.B. Watson
(d) Jean Piaget
Ans. A

128. The process by which our senses adjust their sensitivity to the surrounding environment is called:
(a) Perception
(b) Attention
(c) Sensory Adaptation
(d) Distraction
Ans. A

129. The process by which a child becomes integrated into society by adopting its norms and values, acquiring the necessary skills of social interaction is known as :
(a) Socialization
(b) Social Interaction
(c) Sociability
(d) Affiliation
Ans. A

130. The process by which two people or animals directly each other's behaviour is called:
(a) Social Interaction
(b) Socialization
(c) Affiliation
(d) Sociability
Ans. A

131. Yerkes-Dodson Law is associated with:
(a) Socialization
(b) Affiliation
(c) Social Facilitation
(d) Social Interaction
Ans. C

132. The study of social forms of language and the ways in which language is used in society is known as:
(a) Sociolinguistics
(b) Psycholinguistics
(c) Bilingualism
(d) Trilingualism
Ans. A

133. A device to convert a biological signal such as heart-beat or skin resistance into an electrical signal suitable for recording is known as:
(a) Transducer
(b) Trans-sexual
(c) Galvanometer
(d) Transdoctor
Ans. C

134. A genetic disorder in which the individual has one fewer chromosome than normal resulting in sexual abnormalities is called:
(a) Turner's Syndrome
(b) Brown's Syndrome
(c) Down's Syndromde
(d) Schizophrenia
Ans. A

135. An irrational and excessive fear of strangers is known is:
(a) Oglophohia
(b) Acrophobia
(c) Xenophobia
(d) Agrophobia
Ans. C

136. A rigid and inflexible notion of right and wrong in which "justice is subordinated to adult authority" is known as:
(a) Moral Realism
(b) Moral Relativism
(c) Moral Consequences
(d) Moral Biting
Ans. A

137. Developmental Psychology studies the description, explanation and prediction of:
(a) Child Behaviour
(b) Adult Behaviour
(c) Old age problems
(d) School problems
Ans. A

138. In which period, children were forced to behave and act like adults and according to adult standards?
(a) Ancient Period
(b) Medieval Period
(c) Vedic Period
(d) Modern Period
Ans. A

139. According to the preformationist concept, all adult qualities are found at:
(a) Birth
(b) Death

(c) Adulthood
(d) Adolescence
Ans. A

140. The society during previctorian era was:
(a) Adult-centred
(b) Child-centred
(c) Adolescent-centred
(d) Old men-centred
Ans. A

141. In a book "EMILE" (1962), it was depicted that the child is gifted with an innate moral sense. Who is the author of that book?
(a) J. J. Rousseau
(b) Pestalozzi
(c) Tiedmann
(d) John Locke
Ans. A

142. Maximum number of Baby Biographies was published in:
(a) The 19th century
(b) The 20th century
(c) The 18th century
(d) The 16th century
Ans. A

143. Because of large number of studies on "Child Behaviour" and tremendous emphasis on Child and Developmental psychology, 20th century is called the :
(a) Century of Adults
(b) Century of the child
(c) Century of men and women
(d) Century of women
Ans. A

144. The "Questionnaire technique" was made popular by famous American Psychologist:
(a) G. Stanley Hall
(b) J. B. Watson
(c) Rayner
(d) B. F. Skinner
Ans. A

145. At Yale University, who introduced the "Moving Picture Camera" as an aid to observe young children?
(a) Gessel (1926)
(b) Wallace (1961)
(c) Wyalt (1959)
(d) Spitz (1965)
Ans. A

146. The clinic for the treatment of "problem children" was first established by:
(a) Goodenough (1949)
(b) Wittmer (1896)
(c) Hunt (1961)
(d) Wilt Enborn (1956)
Ans. B

147. The behaviour and activities of the child are expressed quantitatively through the:
(a) Behaviour Rating Method
(b) Projective Technique
(c) Follow up Method
(d) Psychophysical Method
Ans. A

148. The testing method for studying children was first introduced by:
(a) Binet (1905)
(b) Piaget (1960)
(c) Gesell (1949)
(d) Hoffman (1967)
Ans. B

149. Which method is generally used when it becomes necessary to find out if the disease or behaviour problems of the child have relapsed after treatment?
(a) Psychophysical Method
(b) Follow-up Method
(c) Behaviour Rating Method
(d) Method of Individual Diagnosis
Ans. B

150. The progressive series of changes of an orderly, coherent type towards the direction of maturity is called:
(a) Growth
(b) Development
(c) Maturation
(d) Adolescence
Ans. B

151. Among the periods of prenatal development, the period of fetus is:
(a) Most lengthy
(b) Dangerous
(c) Called the period of zygote
(d) Very short
Ans. A

152. The period of Ovum is called the:
(a) Period of Zygote
(b) Period of Embryo
(c) Period of fetus
(d) Period of Disturbances
Ans. A

153. Period of Partunate refers to the:
(a) First 15 to 30 minutes of life
(b) First 15 days of life
(c) First three hours of life
(d) First ten days of life
Ans. A

154. Normally the neonate sleeps for:
(a) 24 hours a day
(b) 18 to 20 hours a day
(c) 6 hours a day
(d) 2 hours a day
Ans. B

155. The Period of Partunate refers to the first 15 to 30 minutes of life, until the infant is cut from:
(a) The umbilical cord
(b) The internal world
(c) The external world
(d) The environmental pressure
Ans. A

156. Darwinian Reflex decreases gradually due to:
(a) Cross connectivism
(b) Transfer
(c) Interference
(d) Atrophy through disuse
Ans. D

157. If an object is placed in the baby's palm, the fingers are closed so strongly that the neonates can support their entire weight by their hands. This prenatal posture is retained by most infants for 3 to 4 weeks after birth. This is popularly known as:
(a) Darwinian Reflex
(b) Luckian Reflex
(c) Pavlovian Reflex
(d) Watsonian Reflex
Ans. A

158. When the infant is placed on his back, he will throw his legs and hands upward as if he is going to embrace somebody. This is popularly known as:
(a) Moro Embrace Reflex
(b) Sucking Reflex
(c) Ocular Reflex
(d) Foot Reflex
Ans. A

159. The development of the ability to walk upright is called:
(a) Locomotor Development

(b) Sensorimotor Learning
(c) Transfer of Training
(d) Bilateral Transfer
Ans. A

160. Ames and Shirley have emphasized the relative stability of the locomotor sequence as an indicator of a function of:
(a) Learning
(b) Maturation
(c) Emotion
(d) Intelligence
Ans. B

161. Who is the author of the famous book "Hereditary Genius"?
(a) Watson
(b) Galton
(c) John Locke
(d) Binet
Ans. B

162. Schiff (1978) has examined the role of genetics in:
(a) Sensory Development
(b) Motor Development
(c) Intellectual Development
(d) Emotional Development
Ans. C

163. Who said —"I propose to show in this book that a man's natural abilities are derived by intelligence under exactly the same limitations as the form and physical features of the whole organic world"?
(a) Galton
(b) J.B. Watson
(c) Binet
(d) Ravens
Ans. A

164. The first part of "Preoperational Period" (Piget) is known as:
(a) Preconceptual Period
(b) Internal Mental Period
(c) Tertiary Circular Reactions
(d) Secondary Circular Reactions
Ans. A

165. During Pre-operational Period, Children are found to be extremely:
(a) Benevolent
(b) Egocentric
(c) Clever
(d) Intelligent
Ans. B

166. Syrup can be made with water and sugar. Again syrup can reduced to sugar by putting it in fire. When

the child is to understand this, he is said to have the capacity of:
(a) Reversibility
(b) Conservation
(c) Seriation
(d) Casuality
Ans. A

167. The mental ability to arrange things in order is known as:
(a) Seriation
(b) Casuality
(c) Reversibility
(d) Conservation
Ans. A

168. The concrete operational stage is responsible for the stability and integration of the child's:
(a) Emotional System
(b) Cognitive System
(c) Learing System
(d) Memory System
Ans. B

169. The concepts of children are generally developed during the period of:
(a) Intuitive Thought
(b) Preoperational Stage
(c) Secondary Circular Reactions
(d) Tertiary Circular Reactions
Ans. A

170. Mental Age (MA) is a measure of the absolute level of:
(a) Emotion
(b) Intelligence
(c) Creativity
(d) Learning
Ans. B

171. The process of classifying all intellectual abilities into a systematic frame work is called:
(a) Structure of Intellect
(b) Structure of Emotion
(c) Structure of Feeling
(d) Structure of Creativity
Ans. A

172. The concept of "Structure of intellect" was proposed by:
(a) Blewett (1964)
(b) Guilford (1961)
(c) Jensen (1969)
(d) Bayley(1969)
Ans. B

173. According to the model "Structure of Intellect", Guifford

revealed that intelligence can be broken into:
(a) 100 factors
(b) 120 factors
(c) 50 factors
(d) 55 factors
Ans. B

174. Who is the author of the article "How much can we boost I.Q. and Scholastic Achievement"?
(a) Prof. Arthur Jensen (1969)
(b) Blewett (1954)
(c) Venkatachar (1930)
(d) Bayley (1969)
Ans. A

175. Jensen's findings indicate the role of heredity on the development and growth of:
(a) Creativity
(b) Emotion
(c) Learning
(d) Intelligence
Ans. D

176. Who has evaluated the findings of "Project Head Start" conducted as a contemporary project to help the socially disadvantaged Negroes and Asiatic origin lower class people ?
(a) Arthur Jensen (1969)
(b) Shields (1962)
(c) Blewett (1954)
(d) Holzinger (1937)
Ans. A

177. While E.B. Titchener holds emotion as an effective state of the organism, Carr (1925) views emotion as a form of:
(a) Energy mobilization
(b) Creativity
(c) Feeling
(d) Daydream
Ans. A

178. Emotional response is weakened if:
(a) Uverlearning takes place
(b) Reason is applied
(c) Interference is there
(d) Goal is achieved
Ans. B

179. The most systematic study on the development of emotion in children from a state of general excitement found at birth has been made by:
(a) Robert Bridges (1932)
(b) J. Hunt (1961)

(c) Hurlock (1978)
(d) Kagan (1962)
Ans. A

180. Impulsive responses of anger are otherwise known as:
(a) Aggression
(b) Regression
(c) Sublimation
(d) Repression
Ans. A

181. Violent outbursts of anger is called:
(a) Tempertantrum
(b) Frustration
(c) Mood
(d) Imprinting
Ans. A

182. Tempertantrum reaches its peak at the age of:
(a) 3 to 4 years
(b) 7 years
(c) 20 years
(d) 25 years
Ans. A

183. Under inhibited response of anger, the child may withdraw to himself as a result of:
(a) Frustration
(b) Learning
(c) Achievement motivation
(d) Distant goal
Ans. A

184. Which mechanism of dream work makes the dream coherent and meaningful?
(a) Secondary Elaboration
(b) Displacement
(c) Sublimation
(d) Dramatization
(e) Condensation
Ans. A

185. Tempertantrum comes to an end by:
(a) 7 years
(b) 19 years
(c) 2 years
(d) 22 years
Ans. B

186. The bright example of self destruction and self aggression is:
(a) Frustration
(b) Suicide
(c) Projection
(d) Introjection
Ans. C

187. Jealousy is an outgrowth of:
(a) Repression
(b) Regression
(c) Anger
(d) Fear
Ans. A

188. The systematized set of vocal habits by means of which the members of a human society interact in terms of their culture is called:
(a) Language
(b) Concept
(c) Thought
(d) Vocabulary
Ans. A

189. When children show resistance to adult authority and does just the opposite of what they ask him to do is called:
(a) Negativism
(b) Rivalry
(c) Bullying
(d) Quarreling
Ans. A

190. "It does indeed seem possible to teach children to think creatively. The most successful approaches seem to be those that involve both cognitive and emotional functioning, provide adequate structures and motivation and give opportunities for involvement, practice and interaction with teachers and other children. Motivating and facilitating conditions certainly make a difference in creative functioning but differences seem to be greatest and most predictable when deliberate teaching is involved Teachers, though their behaviour is an instructional setting can make a lot of difference in the cognitive and affective life of children but they must be sure of their objectives, whether they count to foster creativity in pupils or their own self-ful- filling prophecy."
Who has made this statement?
(a) Torrance
(b) Jensen
(c) Binett
(d) J.W. Taylor
Ans. A

191. Moral Development is intimately linked with stages of:
(a) Intellectual Development

(b) Emotional Development
(c) Creativity
(d) Imitation
Ans. B

192. Who have shown how the ability to moral judgement behaviour that conforms to approved social standard follow a predictable pattern related to the sequence of stages in intellectual development?
(a) Jensen and Binett
(b) Piaget and Kohlberg
(c) Watson and Reynor
(d) Blanton and Blatt
Ans. A

193. Who viewed that moral development occurs in two clear-cut stages—Morality by constraint and morality by Reciprocity?
(a) Jean Piaget
(b) Jensen
(c) Ravens
(d) Binett
Ans. A

194. Guilt is a negative:
(a) Self evaluation
(b) Attitude
(c) Creativity
(d) Sociability
Ans. A

195. Childhood schizophrenia is otherwise known as:
(a) Autism
(b) Tempertantrum
(c) Antridia
(d) Anaphathalmia
Ans. A

196. If a child's eye ball is abnormally small, he is supposed to be affected by:
(a) Oxycephaly
(b) Antridia
(c) Microphathalmia
(d) Anaphathalmia
Ans. B

197. If a child's eyes do not develop at all, he is supposed to be affected by:
(a) Anaphalmia
(b) Oxycephaly
(c) Anaphathalmia
(d) Microphathalmia
Ans. A

198. Sometimes a child's iris fails to develop, visual acuity becomes poor and there is rapid involuntary movement of eye ball. Here the child is affected by:
(a) Anaphathaimia
(b) Oxycephaly
(c) Antridia
(d) Microphathalmia
Ans. C

199. Schiller Spencer theory of play is otherwise known as:
(a) Preparation for Future Adult Activities
(b) Surplus energy theory of play
(c) Recapitulation theory
(d) Instinct Theory
Ans. B

200. Who was the propounder of "Instinct Theory of Play"?
(a) Staneley Hall
(b) McDougall
(c) Patrick
(d) Spencer
Ans. B

201 Which is the most basic and common obstacle to problem solving ?
1 Confirmation bias
2 Fixation
3 Functional fixedness
4 Mental set
Answer:Fixation

202 The child who says "Milk gone" is engaging in _____. This type of utterance demonstrates that children are actively experimenting with rules of _____.
1 Babbling; syntax
2 Telegraphic speech; syntax
3 Babbling ; semantics
4 Telegraphic speech; semantics
Answer:Telegraphic speech; syntax

203 Problem solving comprises of four stages. Choose the correct sequence of stages
1 Incubation, preparation, verification, illumination
2 Preparation, incubation, illumination, verification
3 Incubation, preparation, illumination, verification
4 Preparation, illumination, incubation, verification
Answer:Preparation, incubation, illumination, verification

204 Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R).
Assertion (A) : Thinking about objects brings change in attitudes.
Reason (R) : Attitudes toward complex issues and objects are typically a mixture of positive and negative feelings.
Codes:
1 Both (A) and (R) are true and (R) is the correct explanation of (A).
2 Both (A) and (R) are true, but (R) is not the correct explanation of (A).
3 (A) is true, but (R) is false.
4 (A) is false, but (R) is true.
Answer:Both (A) and (R) are true and (R) is the correct explanation of (A).

205 A subject is presented four non-sense syllabus one by one each for two seconds. After presentation of the four items, the subject is asked to count backward aloud by threes from some number for fifteen seconds and after that he/she is asked to recall the non-sense syllabus. What memory storage is being measured in this experiment ?
1 Sensory memory storage
2 Working memory storage
3 Short term memory storage
4 Long term memory storage
Answer:Short term memory storage

206 When the previously learned task affects the retention of task being currently acquired, the phenomenon is referred to as:
1 Retroactive interference
2 Proactive interference
3 Retroactive effect
4 Proactive effect
Answer:Proactive effect

207 Assertion (A) : Positive psychology draws its strength from humanistic psychology.
Reason (R) : Both humanistic and positive psychology believe in positive human qualities.
Codes:
1 Both (A) and (R) are true and(R) is the correct explanation of (A).
2 Both (A) and (R) are true, but (R) is not the explanation of (A).
3 (A) is true, but (R) is false.
4 (A) is false, but (R) is true.
Answer:Both (A) and (R) are true, but (R) is not the explanation of (A).

208 The basic difference between classical conditioning and instrumental learning is of
1 Presentation of stimulus
2 Emitting of response
3 Temporal contiguity
4 Mechanism
Answer:Mechanism

209 Major criticisms of Thurston's theory of intelligence are based on
I. Use of subjective measures
II. Restricted heterogeneity in sample
III. Method of factor analysis
1 I and II are correct.
2 I and III are correct.
3 II and III are correct.
4 I, II and III are correct.
Answer:II and III are correct.

210 Given below are two statements, one labelled as Assertion (A) and the other labelled as Reason (R). Indicate your answer using the codes given below :
Assertion (A) : Heritability of intelligence explains variations due to genetics for individuals within a given population.
Reason (R) : Earlier the children from deprived families were adopted, the higher their intelligence score will be.
Codes:
1 Both (A) and (R) are true and (R)
2 Both (A) and (R) are true, but (R) is not the correct explanation of (A).
3 (A) is true, but (R) is false.
4 (A) is false, but (R) is true.
Answer:Both (A) and (R) are true, but (R) is not the correct explanation of (A).

211 What is the correct sequence of ear parts given below ?
1 Eardrum – Hammer – Anvil – Stirrup – Oval window
2 Oval window – Hammer – Eardrum – Anvil – Stirrup
3 Eardrum – Anvil – Stirrup – Hammer – Oval window
4 Oval window – Anvil Hammer – Stirrup – Eardrum
Answer: Eardrum – Hammer – Anvil –Stirrup – Oval window

212 We can cope with stress by becoming aware of our irrational, upsetting thoughts and replacing

them with rational, calming thoughts. This view represents.
1 Cognitive behavioural approach
2 Psychoanalytical approach
3 Socio-cultural approach
4 Bio-social approach
Answer:Cognitive behavioural approach

213 An instrumental response isconditioned only when organism interprets the reinforcement as being controlled by its response. This view is supported by
1 Tolman
2 Skinner
3 Seligman
4 Beck
Answer:Seligman

214 When a child gets two chocolates once every week for its performance in the class it is an instance of
1 Fixed ratio, variable interval
2 Fixed ratio, fixed interval
3 Variable ratio, fixed interval
4 Variable ratio, variable interval
Answer:Fixed ratio, fixed interval

215 In a study on 'Career Aspirations of Students', the respondents were required to state their career aspirations in about sixty words. This would be an example of
1 Fixed-alternative item
2 Scale item
3 Open-end item
4 Checklist item
Answer:Open-end item

216. Which of the following implications cannot be derived from Piaget's theory of cognitive development?
(a) Acceptance of individual differences
(b) Sensitivity of children's readiness to learn
(c) Discovery learning
(d) Need of verbal teaching
Answer: (d)

217. According to Lev Vygotsky, the primary cause of cognitive development is:
(a) stimulus-response pairing
(b) social interaction
(c) adjustment of mental schemas
(d) equilibration
Answer: (b)

218. In the context of Kohlberg's stages of moral reasoning, under which stage would the given typical response of a child fall? "Your parents will be proud of you if you are honest. So you should be honest."
(a) Social contract orientation
(b) Punishment-obedience orientation
(c) Good girl-good boy orientation
(d) Law and order orientation
Answer: (c)As a teacher, who firmly believes in social constructivist theory of Lev Vygotsky, which of the following methods would you prefer for assessing your students?

219. According to Jean Piaget, which of the following is necessary for learning?
(a) Active exploration of the environment by the learner
(b) Observing the behaviour of adults
(c) Belief in immanent justice
(d) Reinforcement by teachers and parents
Answer: (a)

Question6. According to Jean Piaget, schema building occurs as a result of modifying new information to fit existing schemes and by modifying old schemes as per new information. These two processes are known as:
(a) assimilation and adaptation
(b) accommodation and adaptation
(c) equilibration and modification
(d) assimilation and accommodation
Answer: (d)

220. According to Piaget, children's thinking differs in ..... from adults than in .....
(a) size, correctness
(b) amount, kind
(c) kind, amount
(d) size, type
Answer: (c)

221. According to Vygotsky, children learn
(a) by maturation.
(b) when reinforcement is offered.
(c) by imitation.
(d) by interacting with adults and peers.
Answer: (d)

222. Kohlberg has given

(a) the stages of cognitive development.
(b) the stages of physical development.
(c) the stages of emotional development.
(d) the stages of moral development.
Answer: (d)

223. According to the pre-conventional level of Kohlberg's theory, to which of the following would an individual turn when making a moral decision?
(a) Personal needs and desires
(b) Individual values
(c) Family expectations
(d) Potential punishment involved
Answer: (d)

224. Which one of the following statements about children would Vygotsky agree with?
(a) Children learn when they are offered lucrative rewards.
(b) Children's thinking can be understood by conducting laboratory experiments on animals.
(c) Children are born 'evil' and need to be controlled through punishment.
(d) Children learn through social interaction with peers and adults.
Answer: (d)

225. According to Piaget, a child between 2 to 7 years is in the _____ stage of cognitive development.
(a) Formal operational
(b) Concrete operational
(c) Sensorimotor
(d) Preoperational
Answer: (d)

226. In Lawrence Kohlberg's theory, which level signifies the absence of morality in the true sense?
(a) Level III
(b) Level IV
(c) Level I
(d) Level II
Answer: (c)

227. In Vygotsky's theory, which aspect of development gets neglected
(a) Social
(b) Cultural
(c) Biological
(d) Linguistic
Answer: (c)

Answer: (a)

228. Which of the following is based on Vygotsky's socio cultural theory?
(a) Operant conditioning
(b) Reciprocal teaching
(c) Culture-neutral cognitive development
(d) Insight learning
Answer: (b)

229. Vygotsky emphasized the significance of the role played by which of the following factors in the learning of children?
(a) Moral
(b) Physical
(c) Social
(d) Hereditary
Answer: (c)

230. A teacher makes use of a variety of tasks to cater to the different learning styles of her learners. She is influenced by
(a) Gardner's multiple intelligence theory
(b) Vygotsky's socio-cultural theory
(c) Piaget's cognitive development theory
(d) Kohlberg's moral development theory
Answer: (a)

231. According to Kohlberg, a teacher can instill moral values in children by
(a) giving strict instructions on 'how to behave'
(b) involving them in discussions on moral issues
(c) laying clear rules of behaviour
(d) giving importance to religious teachings
Answer: (b)

232. According to Piaget's stages of Cognitive Development, the sensori-motor stage is associated with
(a) ability to solve problems in logical fashion
(b) concerns about social issues
(c) ability to interpret and analyse options
(d) imitation, memory and mental representation
Answer: (d)

233. "Children actively construct their understanding of the world" is a statement attributed to
(a) Piaget
(b) Kohlberg

(c) Pavlov
(d) Skinner
Answer: (a)

234. The 'insight theory of learning' is promoted by
(a) 'Gestalt' theorists
(b) Jean Piaget
(c) Pavlov
(d) Vygotsky
Answer: (a)

235. Four distinct stages of children's intellectual development are identified by
(a) Erikson
(b) Kohlberg
(c) Skinner
(d) Piaget
Answer: (d)

236. Which of the following statements describes Piaget and Vygotsky's views on language and thought correctly?
(a) According to Vygotsky, thought emerges first and according to Piaget, language has a profound effect on thought.
(b) Both view language as emerging from the child's thought.
(c) According to Piaget, thought emerges first and according to Vygotsky, language has a profound effect on thought.
(d) Both view thought as emerging from the child's language.
Answer: (c)

237. The concept of 'private speech' of children as proposed by Vygotsky
(a) shows that children are stupid and thus need guidance of adults.
(b) illustrates that children are egocentric.
(c) shows that children love themselves.
(d) illustrates that children use speech to guide their own actions.
Answer: (d)

238. According to Vygotsky, learning cannot be separated from
(a) its social context.
(b) perception & attentional processes.
(c) reinforcement.
(d) a measurable change in behaviour.
Answer: (a)

239. In a constructivist classroom as envisioned by Piaget and Vygotsky, learning
(a) is constructed by the students themselves who play an active role.
(b) is offering of reinforcement by the teacher.
(c) is dictated by the teacher and the students are passive recipients of the same.
(d) happens by pairing of a stimulus and a response.
Answer: (a)

240. What is a major criticism of Kohlberg's theory?
(a) Kohlberg did not give clear cut stages of moral development.
(b) Kohlberg proposed a theory without any empirical basis.
(c) Kohlberg proposed that moral reasoning is developmental.
(d) Kohlberg did not account for cultural differences in moral reasoning of men and women.
Answer: (d)

241. Which one of the following statements best summarizes the relationsib between development and learning as proposed by Vygotsky?
(a) Learning and development are parallel processes.
(b) Development is synonymous with learning
(c) Development process lags behind the learning process.
(d) Development is independent of learning.
Answer: (c)

242. The choice between automatic and controlled processes is:

a. **Typically automatic**
b. **Typically controlled**
c. **Always automatic**
d. **Always controlled**

Answer:
a. Typically automatic

243. Automatic processes _____ motivations.

a. **Influence**
b. **Are influenced by**
c. **A and B**
d. **Neither A nor B**

Answer:
c. A and B

244. Proceduralized judgments are:

a. Developed without practice
b. Preemptive over non-proceduralized judgments
c. Slower than non-proceduralized judgments
d. Deliberate and thoughtful

Answer:
b. Preemptive over non-proceduralized judgments

245. Judgments about others' _____ are often automatic.

a. Traits
b. Behavior
c. A and B
d. Neither A nor B

Answer:
a. Traits

246. Automatic and controlled processes can be triggered by:

a. Subliminal primes
b. Supraliminal primes
c. A and B
d. Neither A nor B

Answer:
c. A and B

247. An ironic rebound effect:

a. Occurs during the period of time when one is asked to suppress thoughts
b. Occurs when one is no longer attempting to suppress thoughts
c. Can be prevented by substituting different thoughts for the unwanted thoughts
d. B and C

Answer:
b. Occurs when one is no longer attempting to suppress thoughts

248. Goal-directed automaticity is:

a. Adaptive
b. Maladaptive
c. A and B
d. Neither A nor B

Answer:
c. A and B

249. The conscious will is an example of:

a. Automatic process
b. Controlled process
c. Intention
d. Behavior

Answer:
b. Controlled process

250. First-order consciousness necessarily involves:

a. Being mindful
b. Having self-esteem
c. Thinking about one's own thoughts
d. Causing one's own behavior

Answer:

a. Being mindful

251. Mind-wandering is an example of:

a. Stimulus-dependent thought
b. Stimulus-independent thought
c. Unconscious thought
d. Default network deactivation

Answer:

b. Stimulus-independent thought

252. _____ is a thought-sampling technique frequently used outside the laboratory:

a. Experience sampling
b. Think-aloud paradigm
c. Videotaping
d. A and C

Answer:

a. Experience sampling

253. It is possible to study people's thoughts in a useful way when:

a. People report on their thoughts while they are happening
b. People report on the content of their thoughts
c. People report on their thought processes
d. A and B

Answer:

d. A and B

254. The human need to belong preempts:

a. The need for understanding
b. The need for social control
c. Controlled processes in social cognition
d. All of the above

Answer:

a. The need for understanding

255. The dual-process model and continuum model of impression formation:

a. Do not depend on motivation
b. Both propose stable cognitive representations at different stages of impression formation

c. Both suggest distinct rules for proceeding to each stage of impression formation
d. Both involve an interplay of automatic and controlled processes

Answer:
d. Both involve an interplay of automatic and controlled processes

256. Cognitive structures, according to Piaget's theory, are all of the following except—
(A) Concept, beliefs, abilities or perceptual styles
(B) Physiological organs
(C) End results of continuous interrupting between maturation and experience
(D) Foundation stones of child's intellectual development.
Ans. (B)

257. What is the example of thinking fan, car, radio as alive things by child?
(A) Inappropriate thinking
(B) Imaginative thinking
(C) Animism
(D) Egocentrism
Ans. (C)

258. Distinctive feature of a concept varying from concept to concept is known as—
(A) Concept value
(B) Concept attribute
(C) Concept quality
(D) Concept uniqueness
Ans. (B)

259. When the muscles necessary for speaking are paralyzed then—
(A) Thinking cannot go on
(B) Verbal thinking cannot go on
(C) Verbal thinking can go on
(D) Problem solving ability is hampered
Ans. (C)

260. The symbols used in thinking are—
(A) Images
(B) Languages
(C) Concept
(D) All of the above
Ans. (D)

261. A condition which is not favourable in reasoning is—
(A) Suggestion
(B) Interest

(C) Attention
(D) Motivation
Ans. (A)

262. The rules used in problem solving are—
(A) Algorithm
(B) Heuristics
(C) Both (A) and (B)
(D) Theoreurs
Ans. (C)

263. According to Guilford creative ability is—
(A) Highly specified associated with particular subject matter or disciplines.
(B) Somewhat general which can be applied to a variety of tasks.
(C) A composite of primary mental abilities as found by Thurstone
(D) A developed mental capacity of highly abstract nature.
Ans. (B)

264. Which is not an attribute of the concept?
(A) Concreteness, observability and measurability
(B) Psychological meaningfulness
(C) Intrinsic, functional and formal properties.
(D) Abstractness, inclusiveness or generality
(E) Structure
Ans. (A)

265. Concept of food including bread, butter, milk etc. is based on—
(A) Formal properties
(B) Intrinsic properties
(C) Psychological meaningful property
(D) Functional properties
Ans. (D)

266. The best way of problem-solving is—
(A) Rigidity
(B) Chance
(C) Insight
(D) Trial and error
Ans. (C)

267. Which is not the structural attribute of the concept?
(A) Conjunctive
(B) Associative
(C) Disjunctive
(D) Relational
Ans. (B)

268. Religion is a—
(A) Conjunctive concept
(B) Disjunctive concept
(C) Relational concept
(D) Functional concept
Ans. (B)

269. Who had proposed the concept of goal gradient in problem solving?
(A) Kohler
(B) Hull
(C) Brich
(D) Wertheimer
Ans. (B)

270. All of the following factors influence concept formation except—
(A) Distinctiveness
(B) Manipulability of material
(C) Instructions
(D) Psychological variables
Ans. (D)

271. Who demonstrated that negative examples are of no use in concept learning?
(A) Smoke, 1932
(B) Hovland and Weiss, 1953
(C) Both of these
(D) None of these
Ans. (C)

272. Which of the following is not a method or procedure of concept learning?
(A) Method of reception
(B) Method of recitation
(C) Method of selection
(D) Both method of reception and method of selection
Ans. (B)

273. All of the following are kind of reasoning except—
(A) Deductive reasoning
(B) Inductive reasoning
(C) Creative reasoning
(D) Evaluative reasoning
(E) Analogical reasoning
Ans. (C)

274. Three of the following mean same thing while one does not—
(A) Productive thinking
(B) Reproductive thinking
(C) Creative thinking
(D) Divergent thinking
Ans. (B)

275. A symbol has an/a—
(A) Universal meaning

(B) Innate meaning
(C) Natural meaning
(D) Arbitrary meaning
Ans. (D)

276. Creative thinking involves the phenomenon of—
(A) Deduction
(B) Insight
(C) Induction
(D) Decision making
Ans. (B)

277. Spoken language is—
(A) An ability found among all animals
(B) A species specific ability limited to Home Sapiens
(C) An ability confined only to the primates
(D) An innately determined mechanism in all animals
Ans. (B)

278. The concepts of taller, older, up-down, north-south etc. are examples of—
(A) Relational concepts
(B) Conjunctive concepts
(C) Disjunctive concepts
(D) Functional concepts
Ans. (A)

279. Most of creative thinking activity occurs during the stage of—
(A) Preparation
(B) Illumination
(C) Incubation
(D) Evaluation
Ans. (C)

280. The smallest unit of meaning in speech perception is—
(A) Morphemes
(B) Phonemes
(C) Words
(D) Syllables
Ans. (A)

281. In a typical memory experiment, participants are asked to recall stimuli in which phase?
a. presentation
b. test
c. material
d. distinction
Answer: B

282. Participants are NOT told that they will be tested on a list of words presented in an experiment. This provides evidence of

a. intentional learning
b. a practice effect
c. incidental learning
d. masked learning

Answer: C

283. A test where participants are asked to retrieve in any order stimuli previously presented is

a. cued recall
b. implicit memory
c. explicit memory
d. free recall

Answer: D

284. Participants take part in an experiment where they learn a number of words and are told that they will be tested later on what they have learned. This is a test of

a. explicit memory
b. recognition
c. implicit memory
d. interference

Answer: A

285. Storage is

a. the stage of memory where information is interpreted and transferred
b. the stage of memory where information is committed
c. the stage of memory most affected by direct manipulation in experiments
d. the stage of memory between presentation of stimuli and before test

Answer: D

286. Investigating what factors can affect memory storage can be done by

a. manipulating what happens before the test phase
b. informing people that they will be tested
c. providing recall cues
d. manipulating what happens at the presentation phase

Answer: A

287. Which is NOT typically used to test memory retrieval?

a. dot probe task
b. word stem completion
c. cued recall
d. serial position effects

Answer: A

288. With immediate testing, recall accuracy is poorest for items that occur in which position of a list?

a. beginning
b. middle
c. end
d. no difference

Answer: B

289. Immediately testing recall can lead to greater recall for words at the end of a list. This is

a. recency effect
b. primacy effect
c. serial position effect
d. superiority effect

Answer: A

290. The recency effect in memory retrieval can be reduced when

a. rehearsal is prevented
b. short- to long-term memory interference is introduced
c. a backwards masking task is used
d. retention interval is increased

Answer: D

291. Which authors proposed the modal model of memory?

a. Lansdale and Baguley (2008)
b. Tulving and Thompson (1975)
c. Atkinson and Shiffrin (1968)
d. Craik and Lockhart (1972)

Answer: C

292. The modal model of memory was challenged on the grounds that

a. impaired short-term memory does not disrupt long-term memory
b. Short-term memory has a limited capacity
c. longer time in short-term memory predicts likelihood of long-term memory
d. long-term memory has a limited capacity

Answer: A

293. According to levels of processing, which of the following leads to the deepest level of memory?

a. perceptual
b. semantic
c. associative
d. cue dependent

Answer: B

294. A critical issue with the 'levels of processing' account of memory is

a. the distinction between perceptual and semantic processing
b. it is not compatible with the modal model
c. determining the level of processing
d. it does not explain how information is retrieved

Answer: C

295. Retrieval cues can improve recall because of

a. overlap between memories at encoding
b. interference or decay
c. traces still in short-term memory
d. greater storage capacity

Answer: A

296. 'Specific operations […] determine what is stored, and what is stored determines what retrieval cues are effective' refers to what term?

a. context-dependent memory
b. encoding specificity principle
c. levels of processing
d. forgetting function

Answer: B

297. Retroactive inhibition is a term of memory

a. decay
b. delay
c. retrieval
d. interference

Answer: D

298. Having prior memory associations that make it difficult to form new memory associations is termed

a. proactive inhibition
b. transfer appropriate processing
c. time-dependent decay
d. encoding specificity

Answer: A

299. Which of the following was proposed by Keppel (1968) to be most likely?

a. prior learning may interfere with new learning only when items are similar, but new learning interferes with all old learning
b. old learning can interfere with new learning, but new

learning interferes with all old learning

c. all forgetting is caused by non-specific proactive inhibition
d. old learning only interferes with new learning when encoded in the same modality

Answer: A

300. What explains the mathematical forgetting curve?

a. retroactive inhibition
b. serial position
c. Jost's law
d. consolidation theory

Answer: C

301. Lansdale and Baguley (2008) predict that the probability of correct recall depends on

a. proportion of correct memory traces
b. encoding specificity
c. context-dependent recall
d. retroactive inhibition

Answer: A

302. Lansdale and Baguley (2008) argue that memory dilution occurs because

a. long-term memory capacity is limited
b. the number of null traces decreases
c. memories become indistinct from similar memories
d. the memory becomes less temporally distinctive

Answer: D

303. Which element was NOT found to alter accounts of the 'War of the Ghosts' story?

a. rationalizations
b. distortions
c. omissions
d. intrusions

Answer: C

304. The study of how the 'War of the Ghosts' story accounts became altered at recall was carried out by

a. Bartlett (1932)
b. Godden and Baddeley (1975)
c. Postman and Phillips (1965)
d. Eysenck (1979)

Answer: A

305. Eyewitness testimonies are an example of what kind of memory experiment?

a. intentional learning
b. context-dependent learning
c. incidental learning
d. cue-dependent learning

Answer: C

306. Which key academic is involved in the study of memory as a reconstructive process?

a. A. Baddeley
b. H. Eysenck
c. G. Hitch
d. E. Loftus

Answer: D

307. The accuracy of eyewitness testimonies can be improved with

a. recovered memories
b. cognitive interviews
c. noise reduction
d. neurofeedback

Answer: B

308. What can help improve the accuracy of eye witness testimonies?

a. serial position
b. context reinstatement
c. mnemonics
d. distributed practice

Answer: B

309. Memory can be improved when information to be learnt is

a. organized
b. written
c. spoken
d. elaborated

Answer: A

310. Which is a good method of revision:

a. intense sessions
b. spaced learning
c. 1 hour on/1 hour off
d. late night sessions

Answer: B

311. Trying to predict your roommate is an example of:

a. Operant thought
b. Respondent thought
c. A and B
d. Neither A nor B

Answer:
a. Operant thought